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DOWN-LOOKING INTERFEROMETER STUDY II. VOLUME II. HANDBOOK OF RE--ETC(U)

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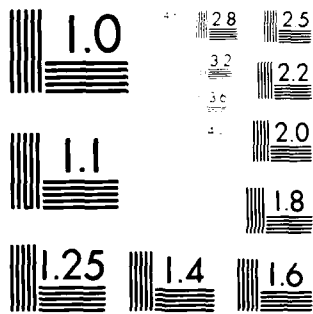
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DOWN-LOOKING INTERFEROMETER STUDY II
VOLUME II: HANDBOOK OF RESULTS

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MARCH 1980

SCIENTIFIC REPORT NO. 3

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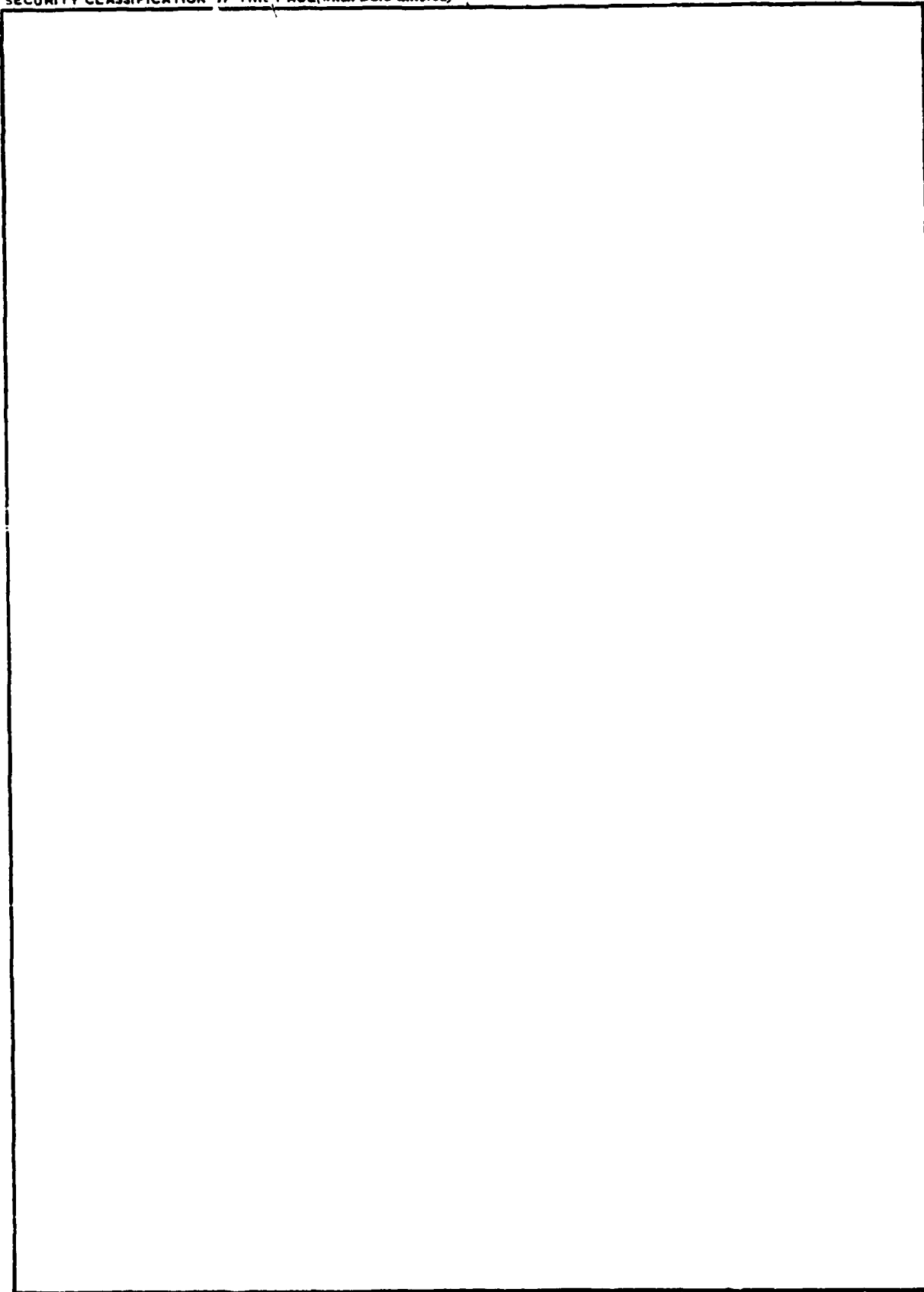
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This volume is a handbook of results for the Down-Looking Interferometer Study II (AFGL-TR-80-0236). Three pages of data are presented in a standard format for each candidate detection band.		

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PREFACE

This handbook of results for the Down-Looking Interferometer Study II is described and summarized in Section I of Volume I. Three pages of data are presented for each candidate detection band in a standard format. The following index gives the number of the first page for each band.

<u>Molecule (Transition)</u>	<u>Detection Band (cm⁻¹)</u>	<u>Page</u>
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<u>Molecule (Transition)</u>	<u>Detection Band (cm⁻¹)</u>	<u>Page</u>
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SO ₂ (v ₁ + v ₃)	2450-2525	69
(v ₁)	1090-1210	72

$C_2H_4O_2$ 880-1000 cm^{-1} region

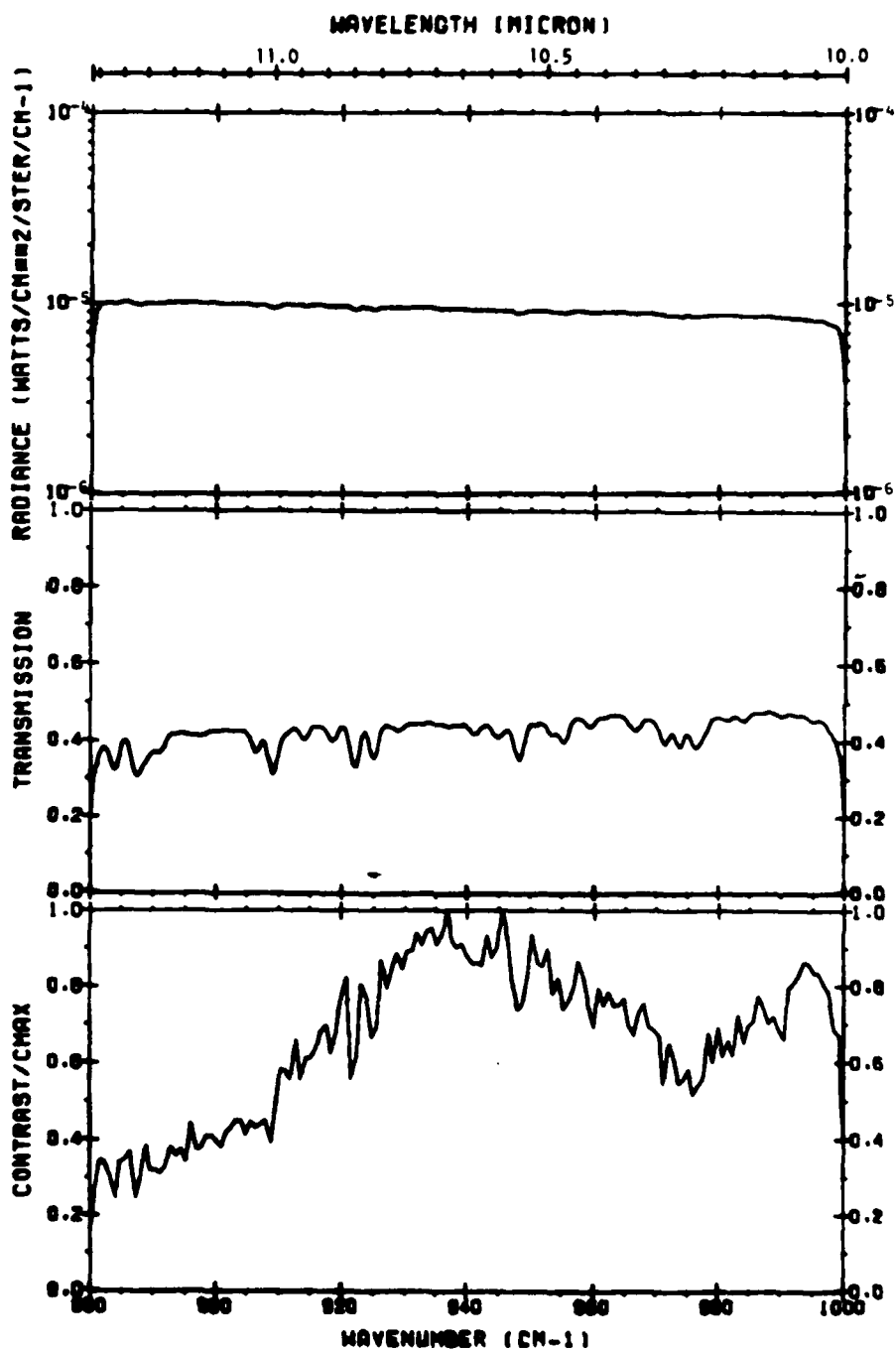
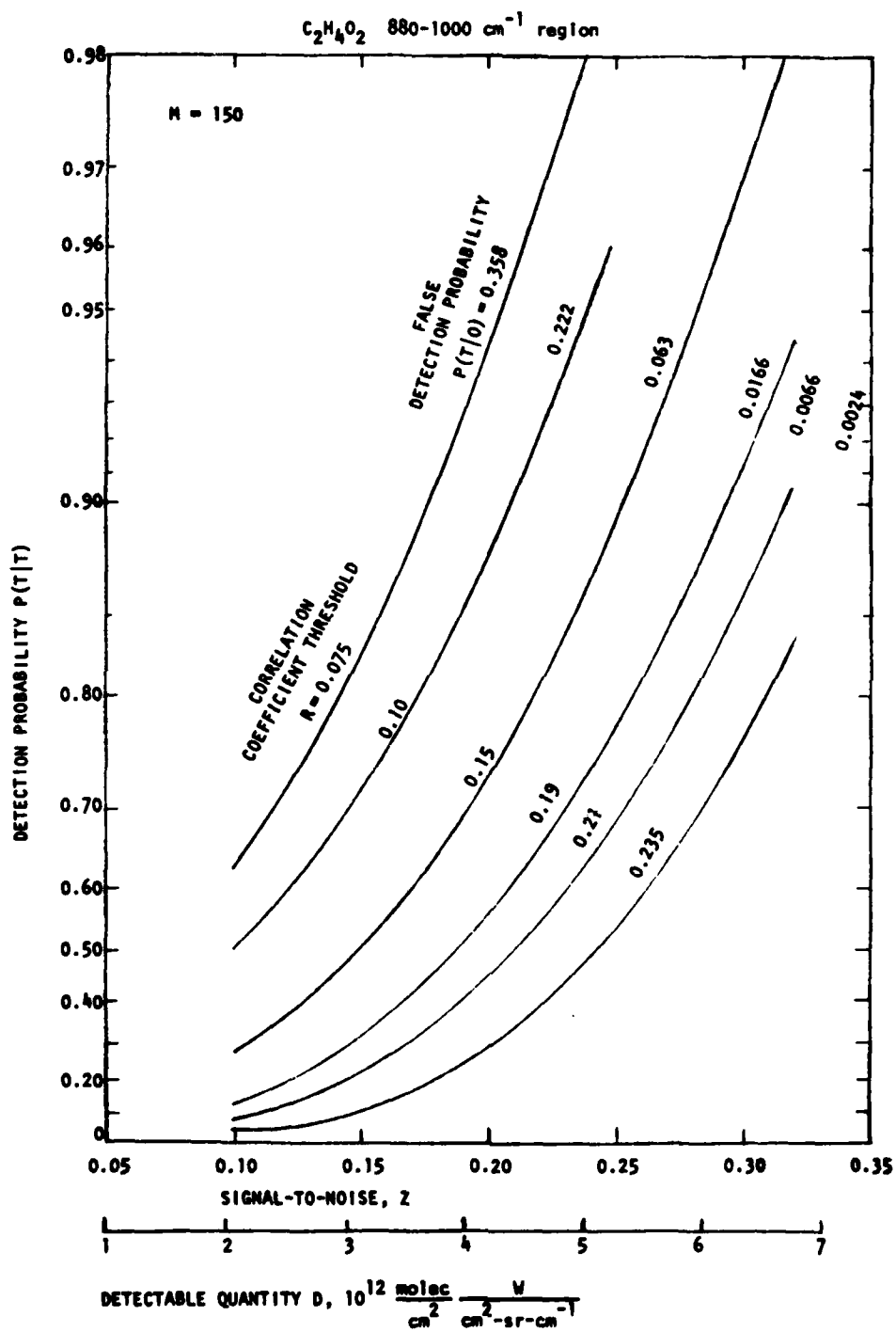
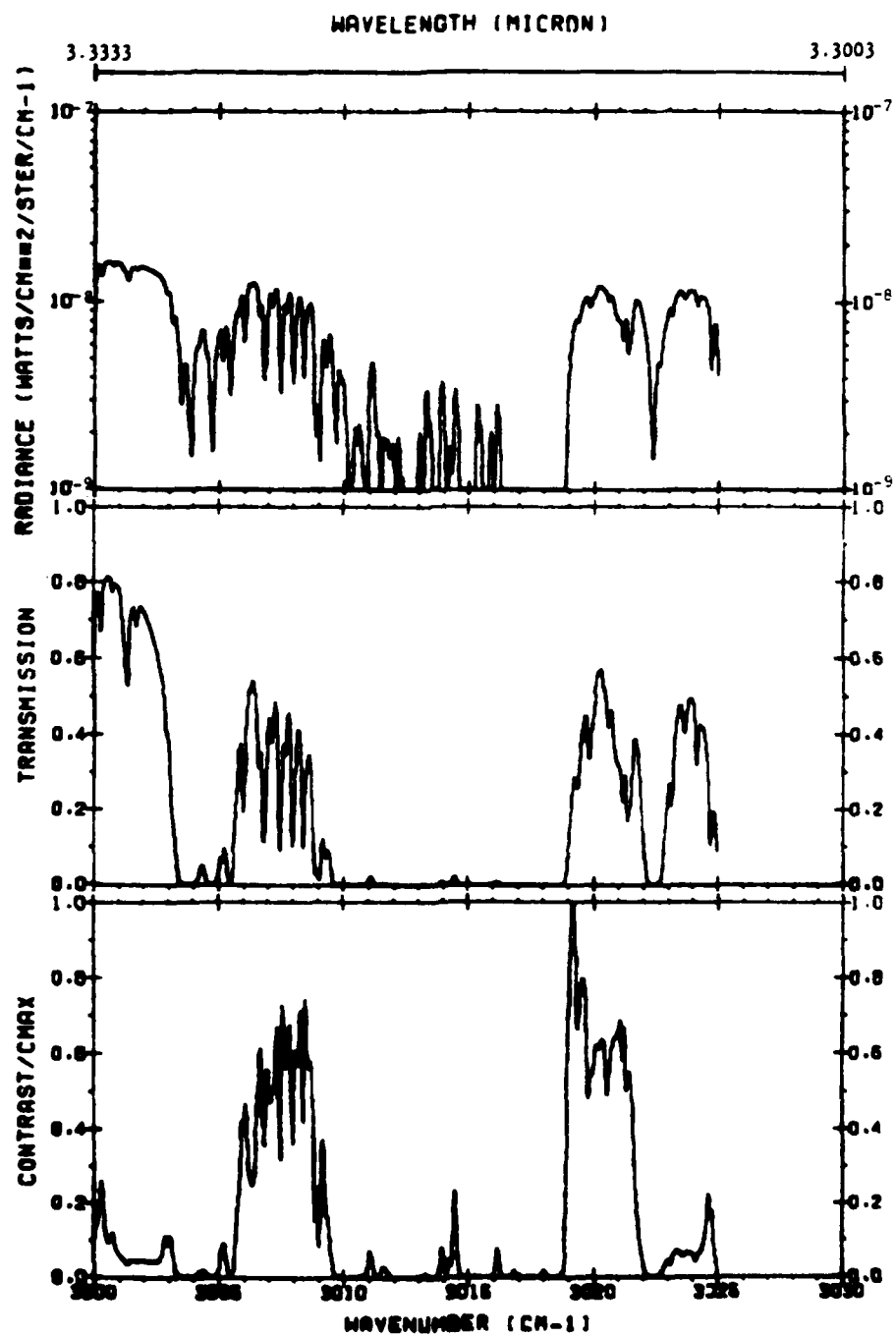


Table 1 Detection Parameters for $C_2H_4O_2$ 880-1000 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	880-1000	cm^{-1}
Approximate wavelength	10.6	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.80$)	M = 150	
BAND PHOTON RADIANCE (scene)	6.00×10^{16}	ph/sec cm^2 sr
Maximum of contrast $\tau_v \alpha_{gv}$	C _{MAX} = 8.38×10^{-20}	$cm^2/molec$
Mean contrast	$\mu' = 5.50 \times 10^{-20}$	$cm^2/molec$
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.69 \times 10^{-20}$	$cm^2/molec$
<hr/>		
* Photon flux density on detector		
* from scene	1.4×10^{15}	phot/sec cm^2
* from internal sources	1.5×10^{15}	phot/sec cm^2
* TOTAL	J = 2.9×10^{15}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	4.2×10^{11}	cm $\sqrt{Hz/W}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 6.54 \times 10^{-4}$	sec
* CORRESPONDING BASELINE NESR	(NESR) ₀ = 2.5×10^{-7}	W/cm^2 sr cm^{-1}
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $2.0 - 7.0 \times 10^{12}$	(molec/ cm^2) (W/ cm^2 sr cm^{-1})
* UNCERTAINTY IN D	$\sigma_{D'} = 5.1 \times 10^{11}$	(molec/ cm^2) (W/ cm^2 sr cm^{-1})



CH₄ v₃ band



CH₄ v₃ band

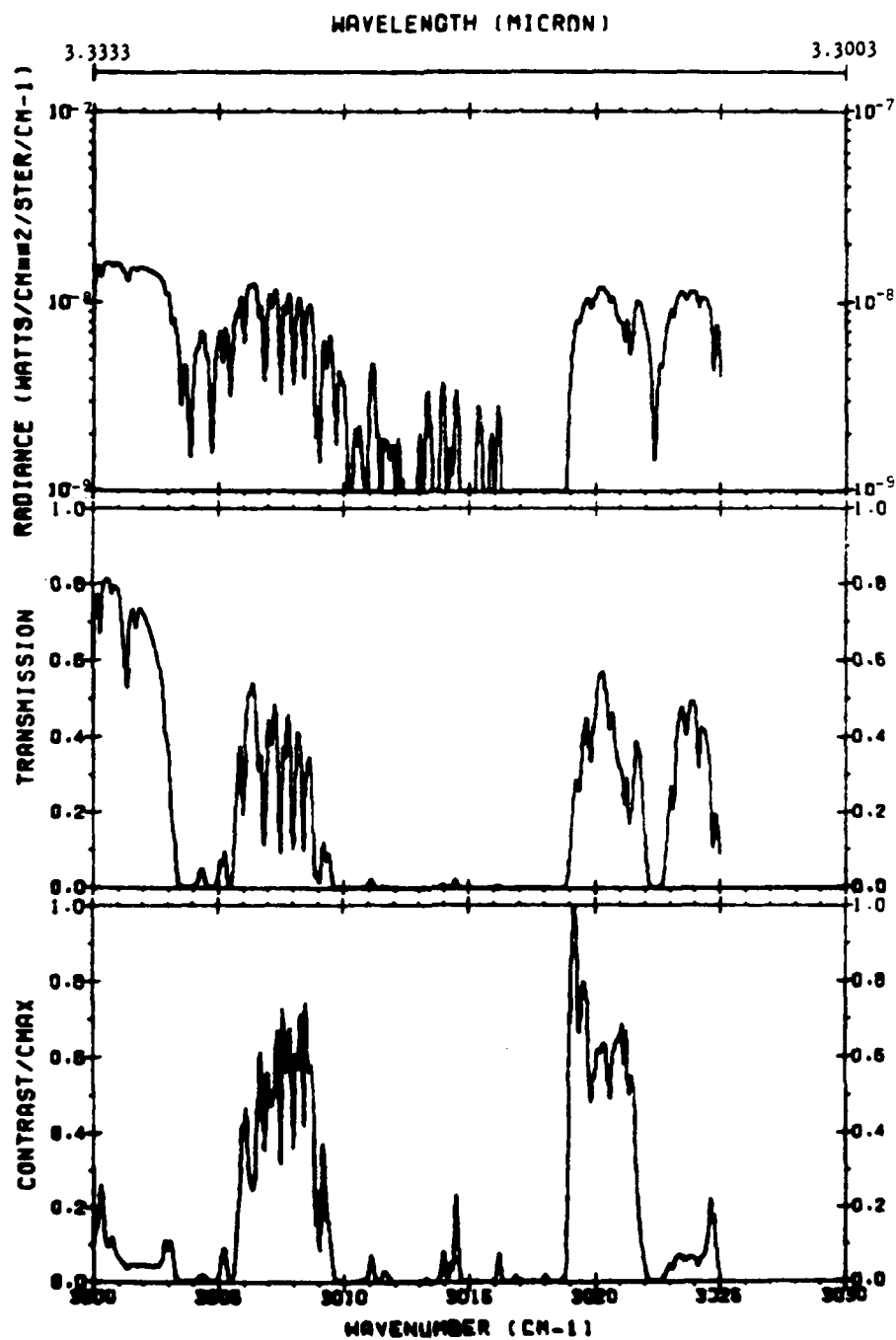
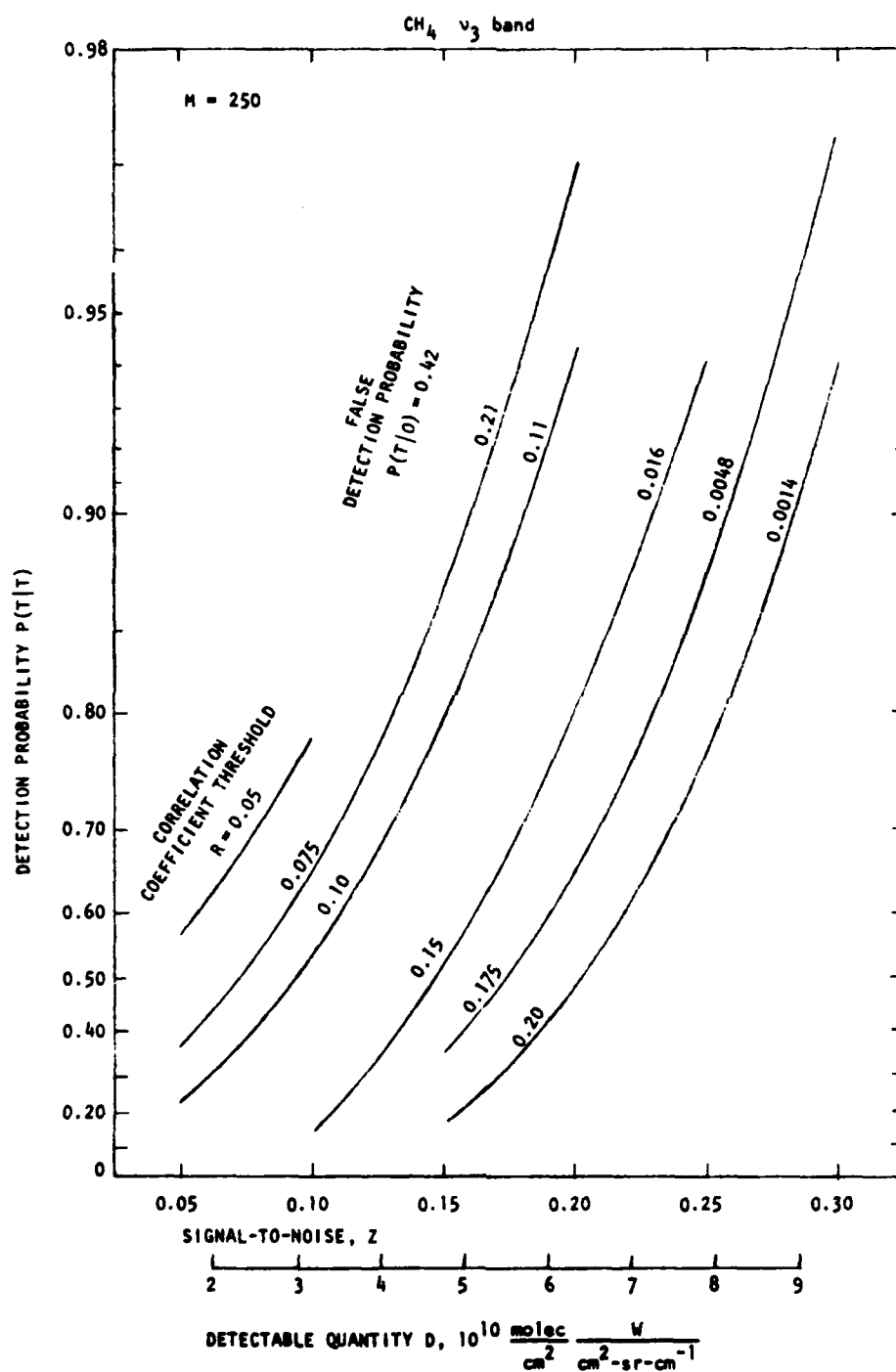
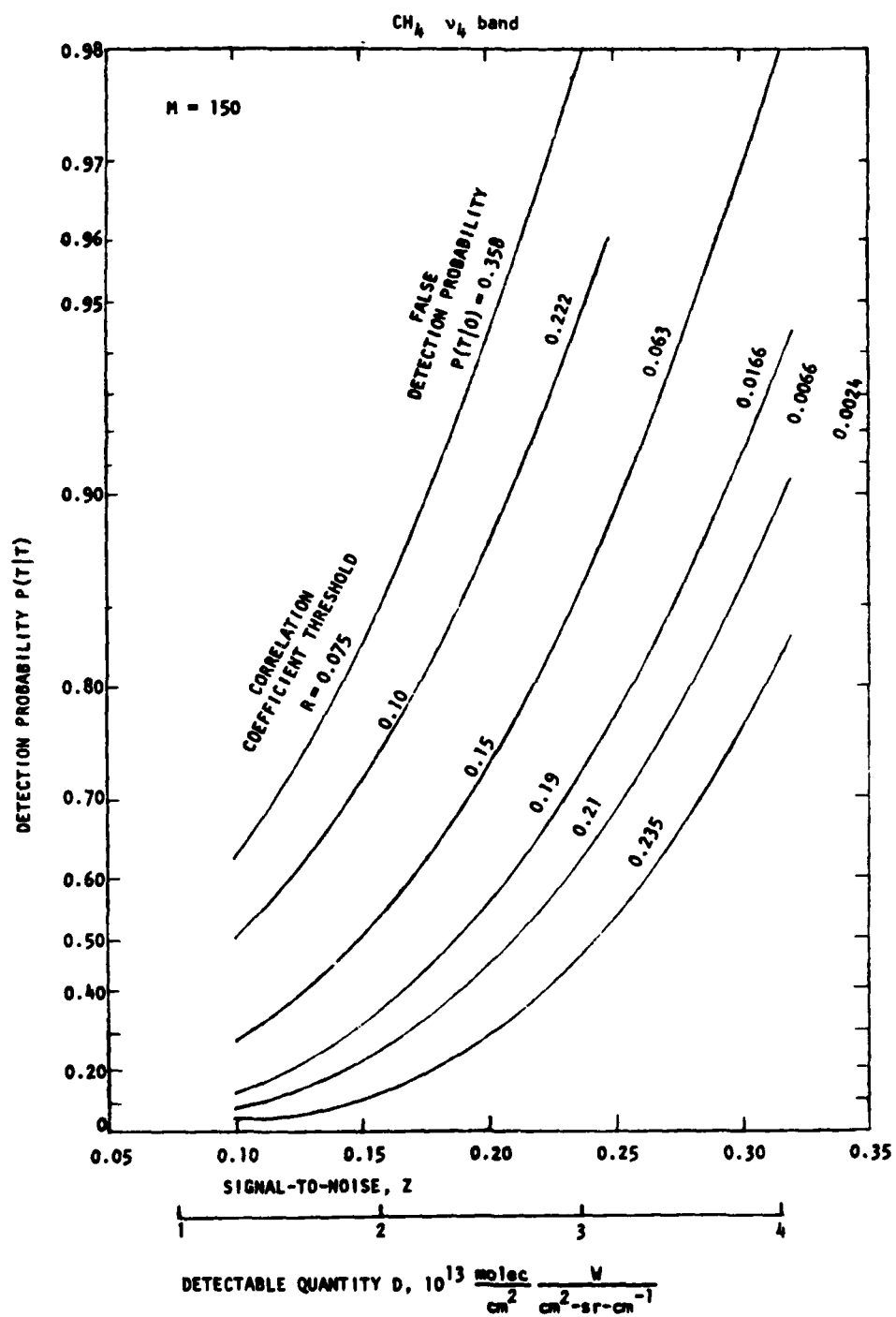
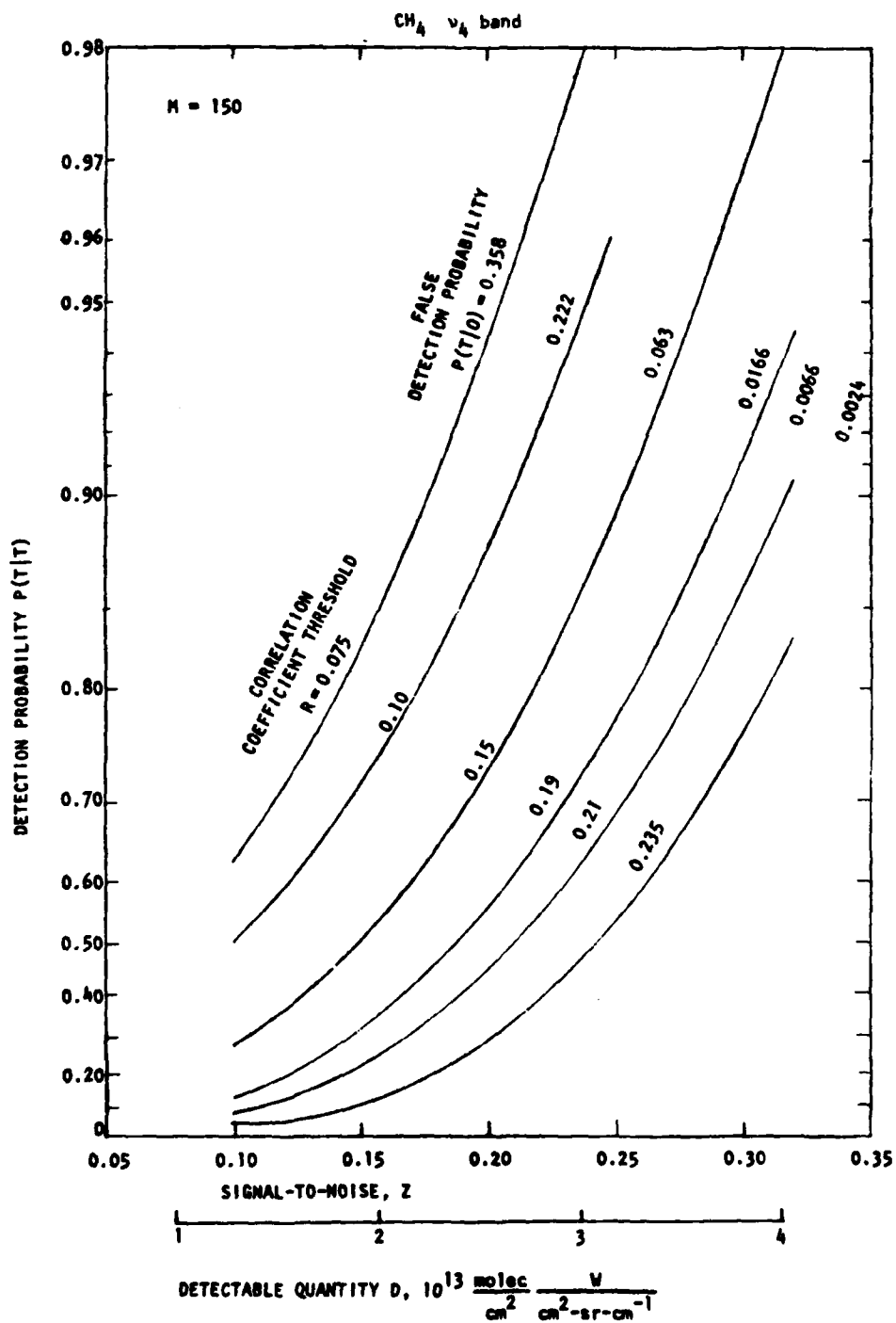


Table 2 Detection Parameters for CH₄ ν_3 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	3000-3025	cm ⁻¹
Approximate wavelength	3.3	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 250	
BAND PHOTON RADIANCE (scene)	2.57×10^{12}	ph/sec cm ² sr
Maximum of contrast $\tau_{\nu}^{\alpha}_{gv}$	C _{MAX} = 1.14×10^{-20}	cm ² /molec
Mean contrast	$\mu' = 1.84 \times 10^{-21}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 2.71 \times 10^{-21}$	cm ² /molec
<hr/>		
* Photon flux density on detector		
* from scene	5.9×10^{10}	phot/sec cm ²
* from internal sources	1.5×10^{11}	phot/sec cm ²
* TOTAL	J = 2.1×10^{11}	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	1.3×10^{13}	cm $\sqrt{\text{Hz}}/\text{W}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 7.79$	sec
* CORRESPONDING BASELINE NESR.	(NESR) ₀ = 6.0×10^{-10}	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $2.5 - 8.0 \times 10^{10}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_D = 1.6 \times 10^{10}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)







CH₃I 790-990 cm⁻¹ region

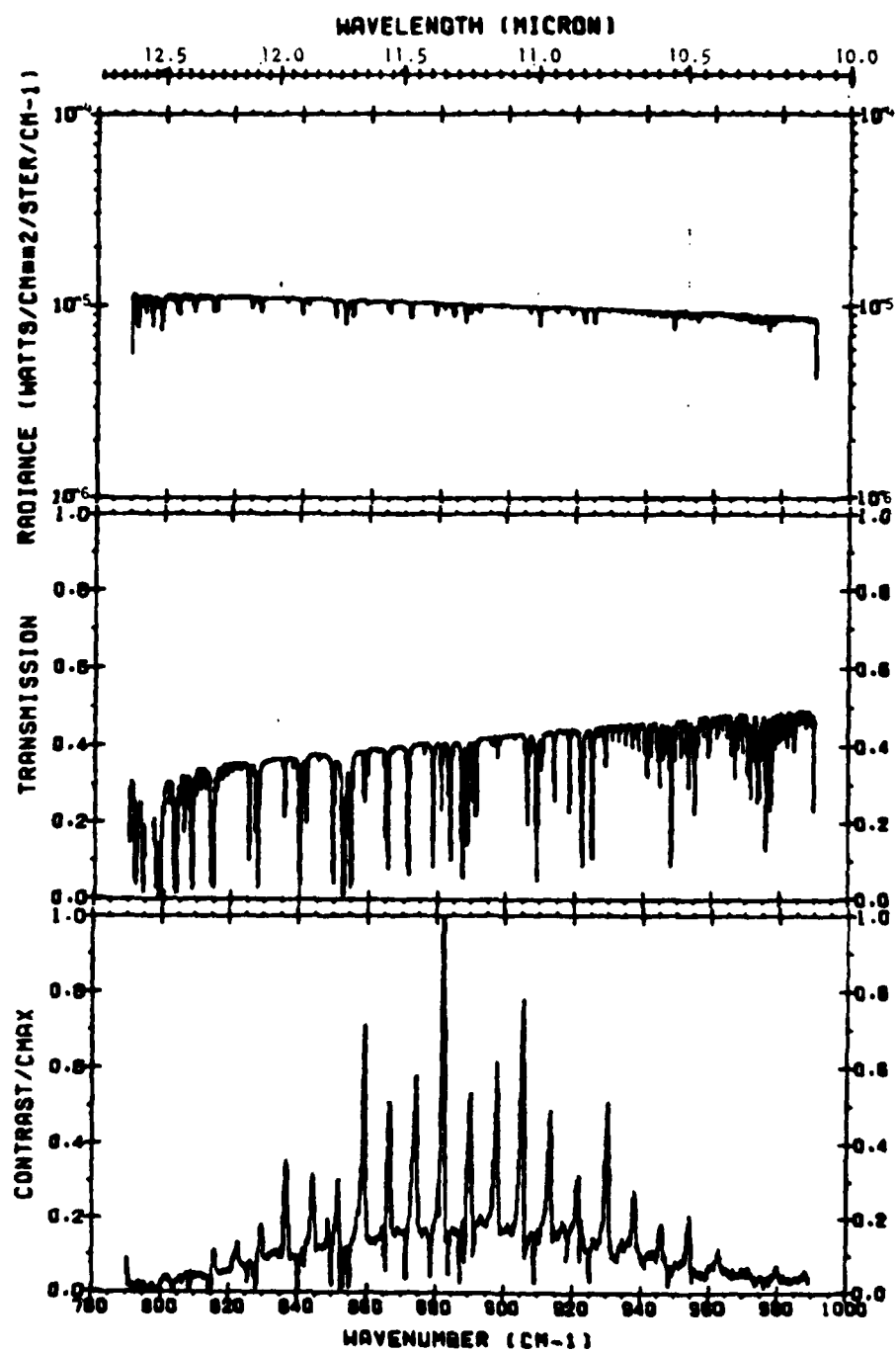
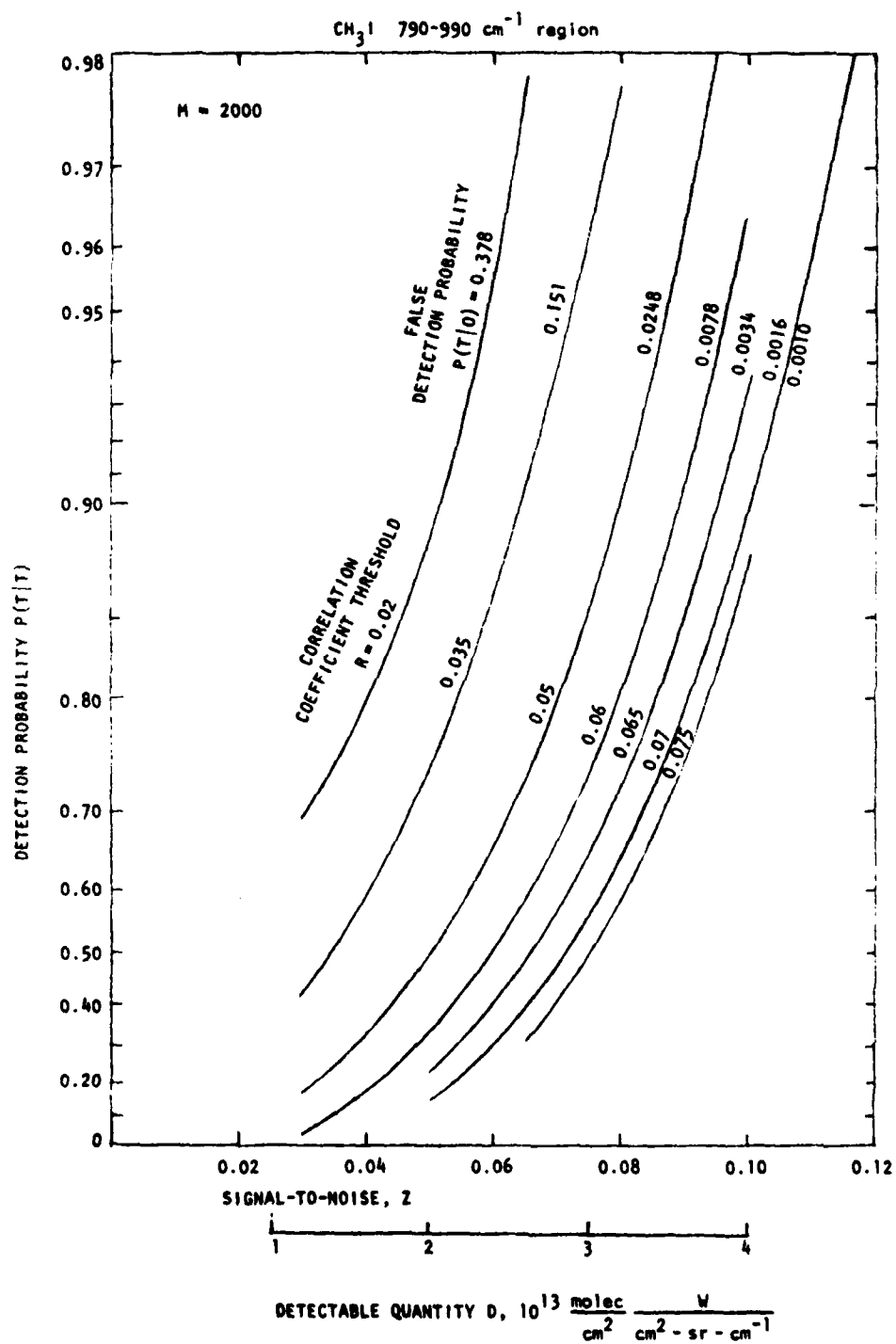


Table 4 Detection Parameters for CH_3I 790-990 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	790-990	cm^{-1}
Approximate wavelength	11.2	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	1.14×10^{17}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_v \alpha_{gv}$	CNAX = 3.62×10^{-20}	cm^2/molec
Mean contrast.	$\mu' = 4.82 \times 10^{-21}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 4.40 \times 10^{-21}$	cm^2/molec
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* Photon flux density on detector		
* from scene.	2.6×10^{15}	phot/sec cm^2
* from internal sources	2.7×10^{15}	phot/sec cm^2
* TOTAL	$J = 5.3 \times 10^{15}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	2.9×10^{11}	$\text{cm } \sqrt{\text{Hz}}/\text{W}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 3.63 \times 10^{-3}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.23 \times 10^{-6}$	$\text{W/cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 1.0 - 3.5 \times 10^{13}$	$(\text{molec/cm}^2)(\text{W/cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 5.96 \times 10^{12}$	$(\text{molec/cm}^2)(\text{W/cm}^2 \text{ sr cm}^{-1})$



CO 1-0 band

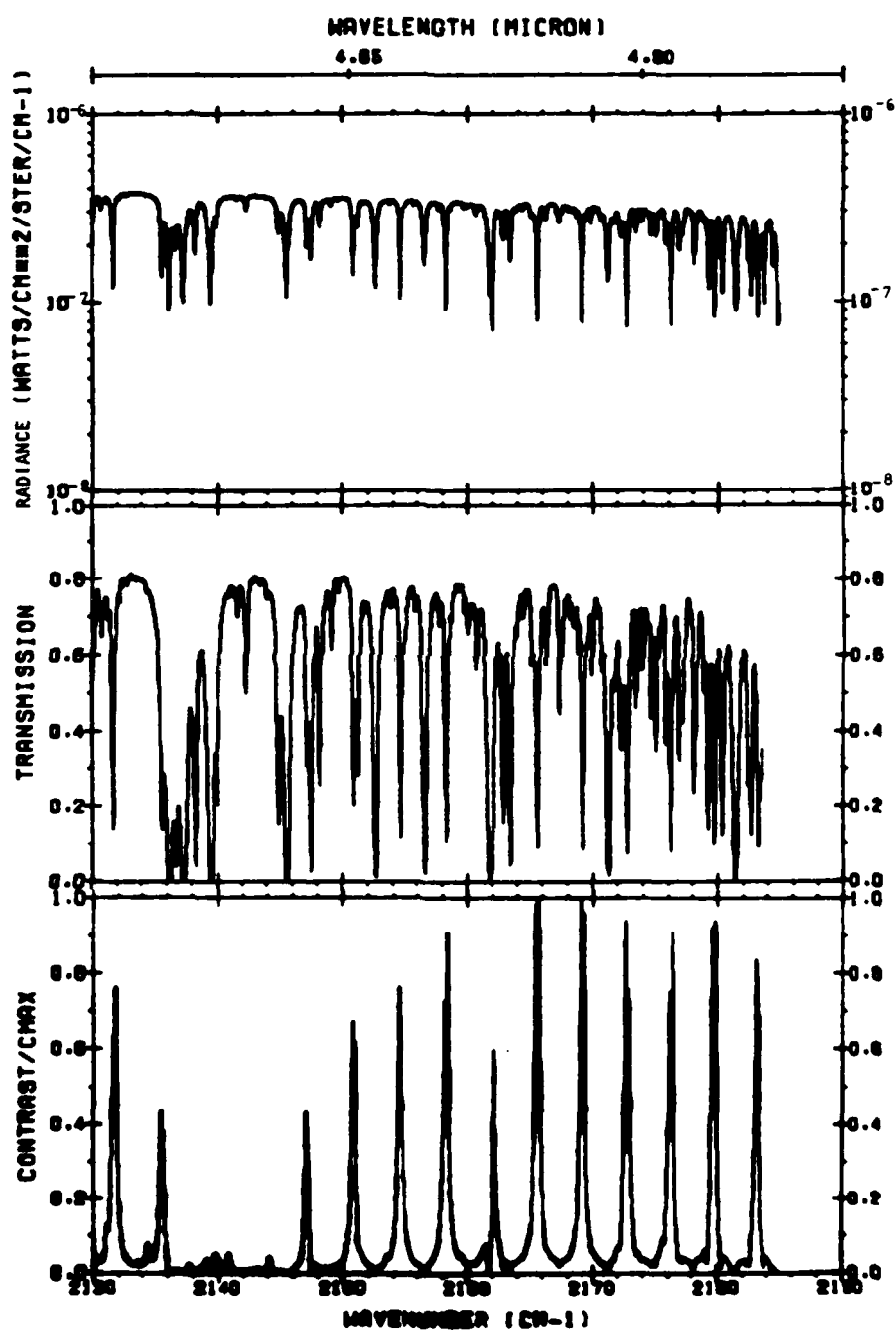
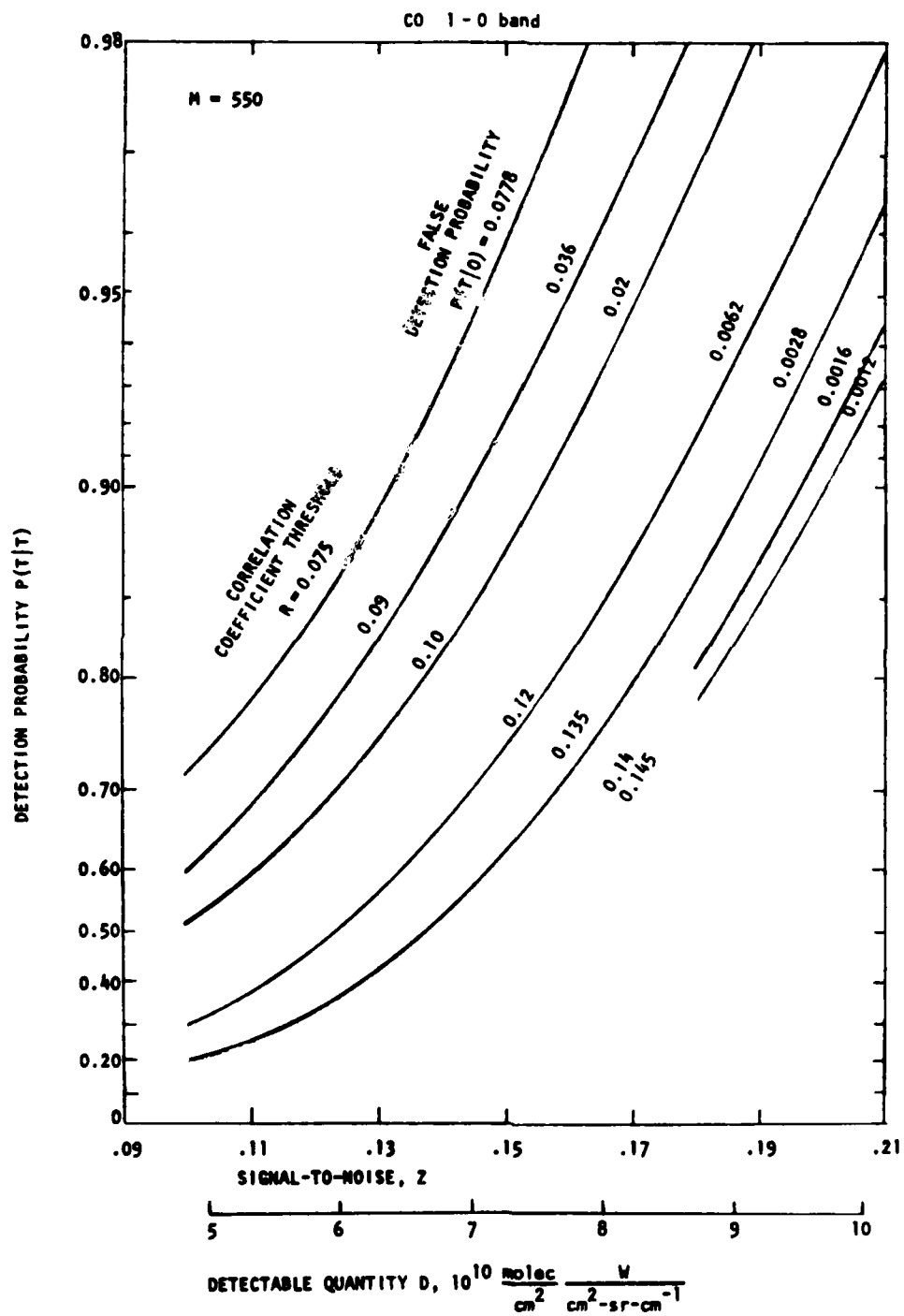


Table 5 Detection Parameters for CO 1-0 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2130-2185	cm^{-1}
Approximate wavelength	4.7	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 550	
BAND PHOTON RADIANCE (scene)	3.66×10^{14}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_v \alpha_{gv}$	C _{MAX} = 2.01×10^{-19}	cm^2/molec
Mean contrast.	$\mu' = 2.09 \times 10^{-20}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 3.64 \times 10^{-20}$	cm^2/molec
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* Photon flux density on detector		
* from scene.	8.3×10^{12}	phot/sec cm^2
* from internal sources	1.0×10^{13}	phot/sec cm^2
* TOTAL	J = 1.9×10^{13}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.9×10^{12}	$\text{cm } \sqrt{\text{Hz}}/\text{W}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 0.833$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.2 \times 10^{-8}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 3.0 - 8.5 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 1.8 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



CO₂ 2375-2400 cm⁻¹ region

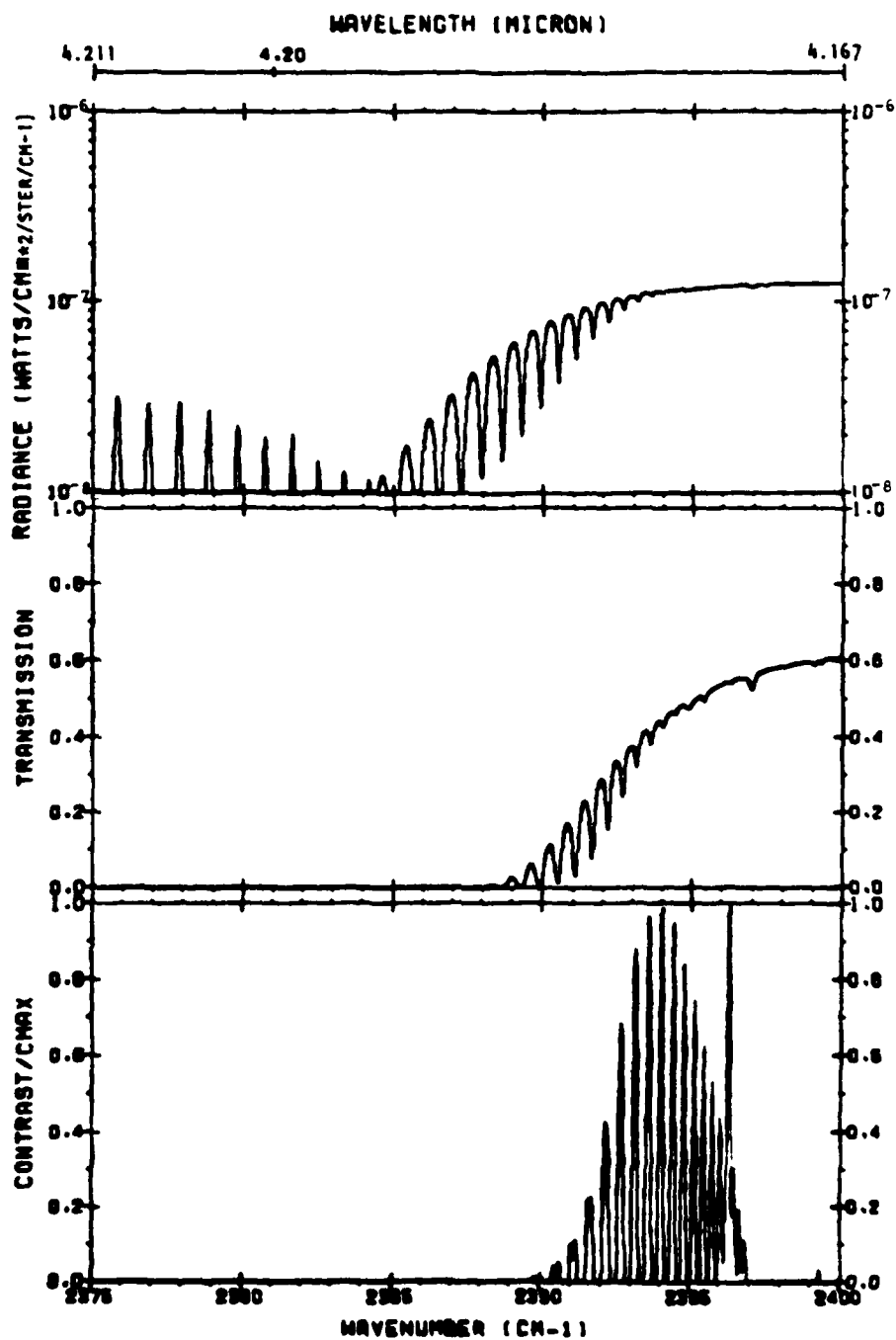
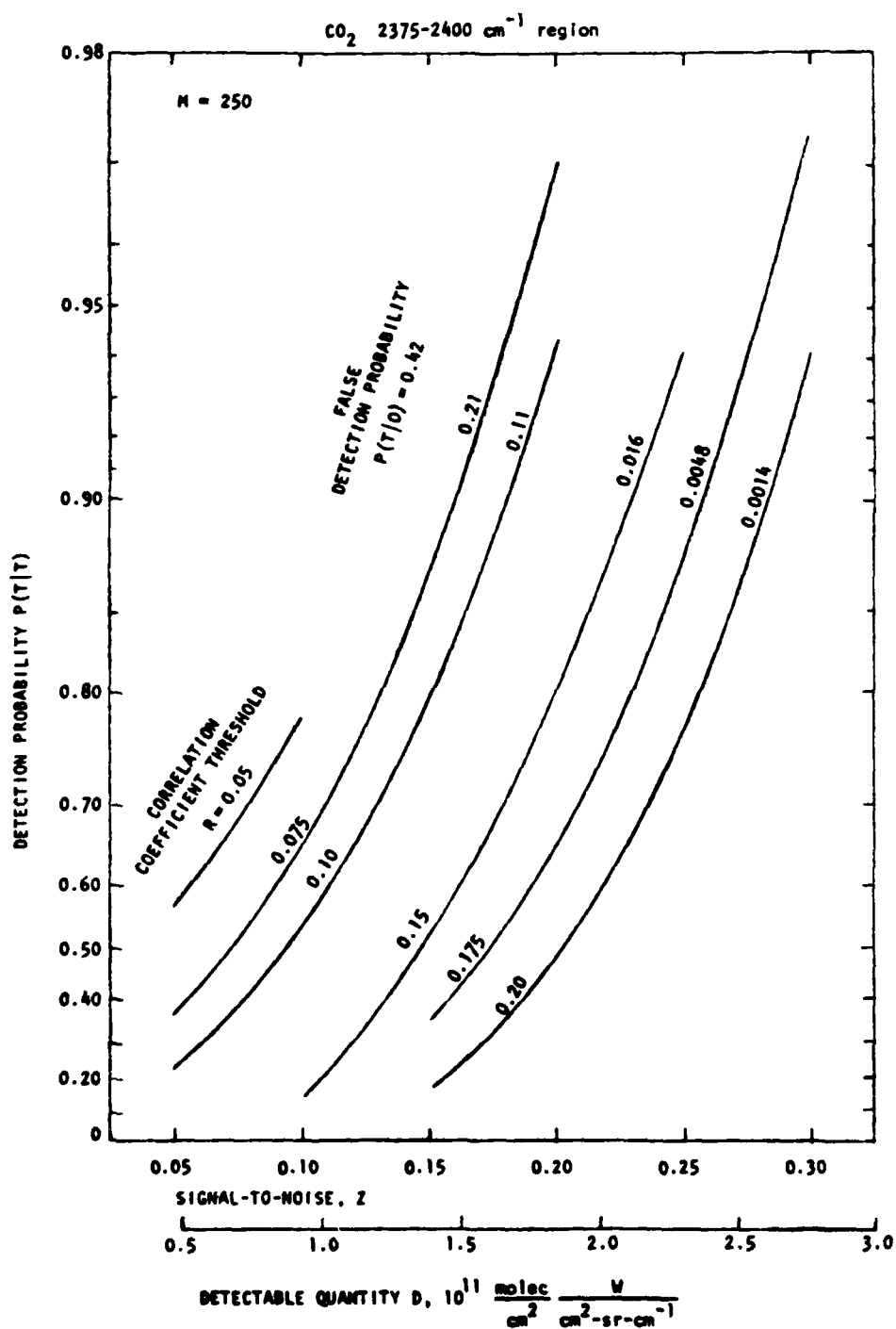


Table 6 Detection Parameters for CO₂ 2375-2400 cm⁻¹ region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2375-2400	cm ⁻¹
Approximate wavelength	4.19	μm
* NO. OF SPECTRAL ELEMENTS (for Δν = 0.10)	M = 250	
BAND PHOTON RADIANCE (scene)	2.75 × 10 ¹³	ph/sec cm ² sr
Maximum of contrast τ _ν α _{gv}	C _{MAX} = ** 2.71 × 10 ⁻²⁰	cm ² /molec
Mean contrast.	μ' = ** 9.72 × 10 ⁻²²	cm ² /molec
STANDARD DEVIATION OF CONTRAST	σ' = ** 4.80 × 10 ⁻²¹	cm ² /molec
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* Photon flux density on detector		
* from scene.	6.3 × 10 ¹¹	phot/sec cm ²
* from internal sources	1.9 × 10 ¹²	phot/sec cm ²
* TOTAL	J = 2.5 × 10 ¹²	phot/sec cm ²
* BLIP D _{λ_c} [*]	4.7 × 10 ¹²	cm √Hz/W
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min t _d = 2.24	sec
* CORRESPONDING BASELINE NESR.	(NESR) ₀ = 3.1 × 10 ⁻⁹	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = ** 1.0 - 2.5 × 10 ¹¹	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	σ _D = ** 5.7 × 10 ¹⁰	(molec/cm ²) (W/cm ² sr cm ⁻¹)

** Assumes CO₂ temperature = 850°K.



DF 2500-2700 cm^{-1} region

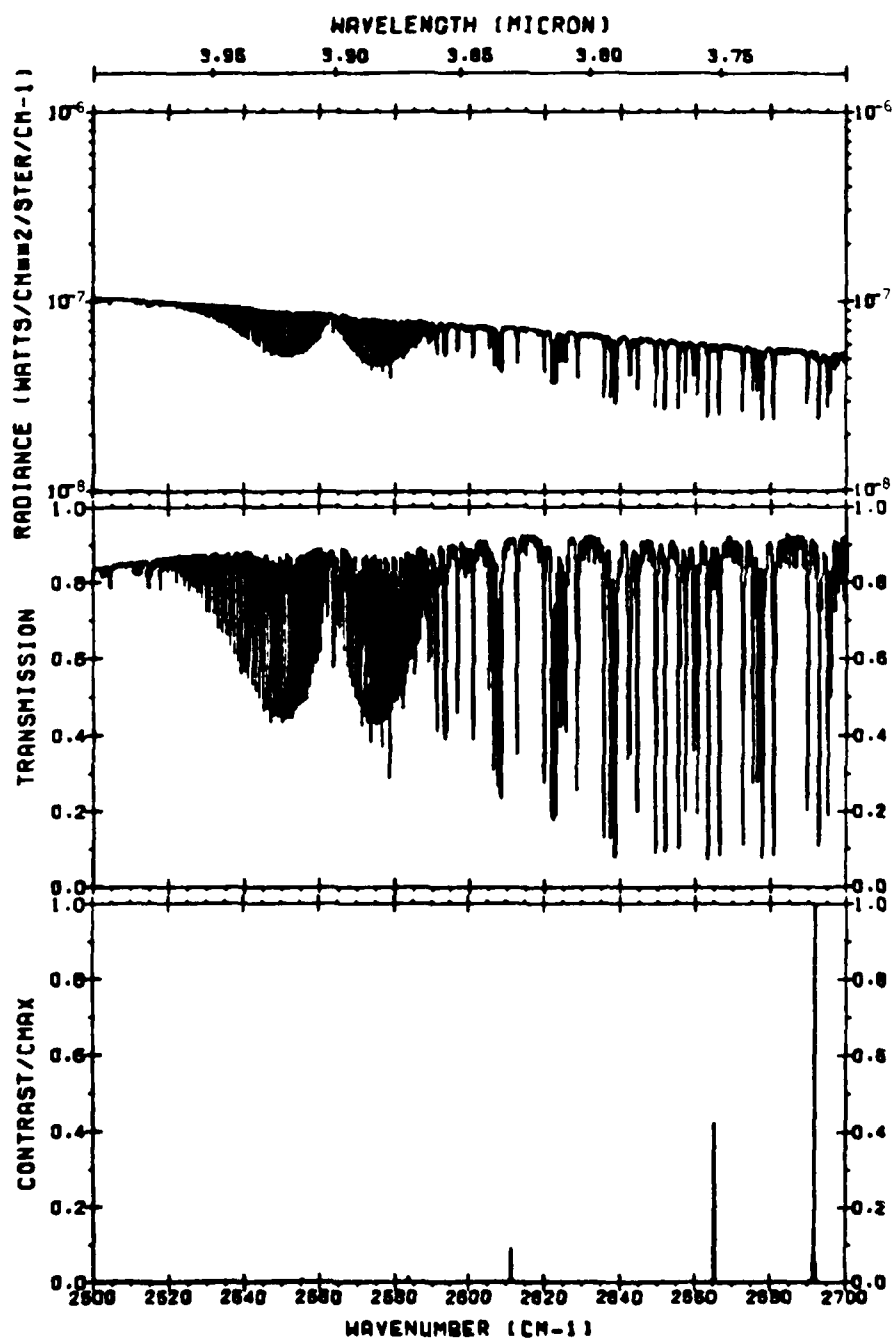
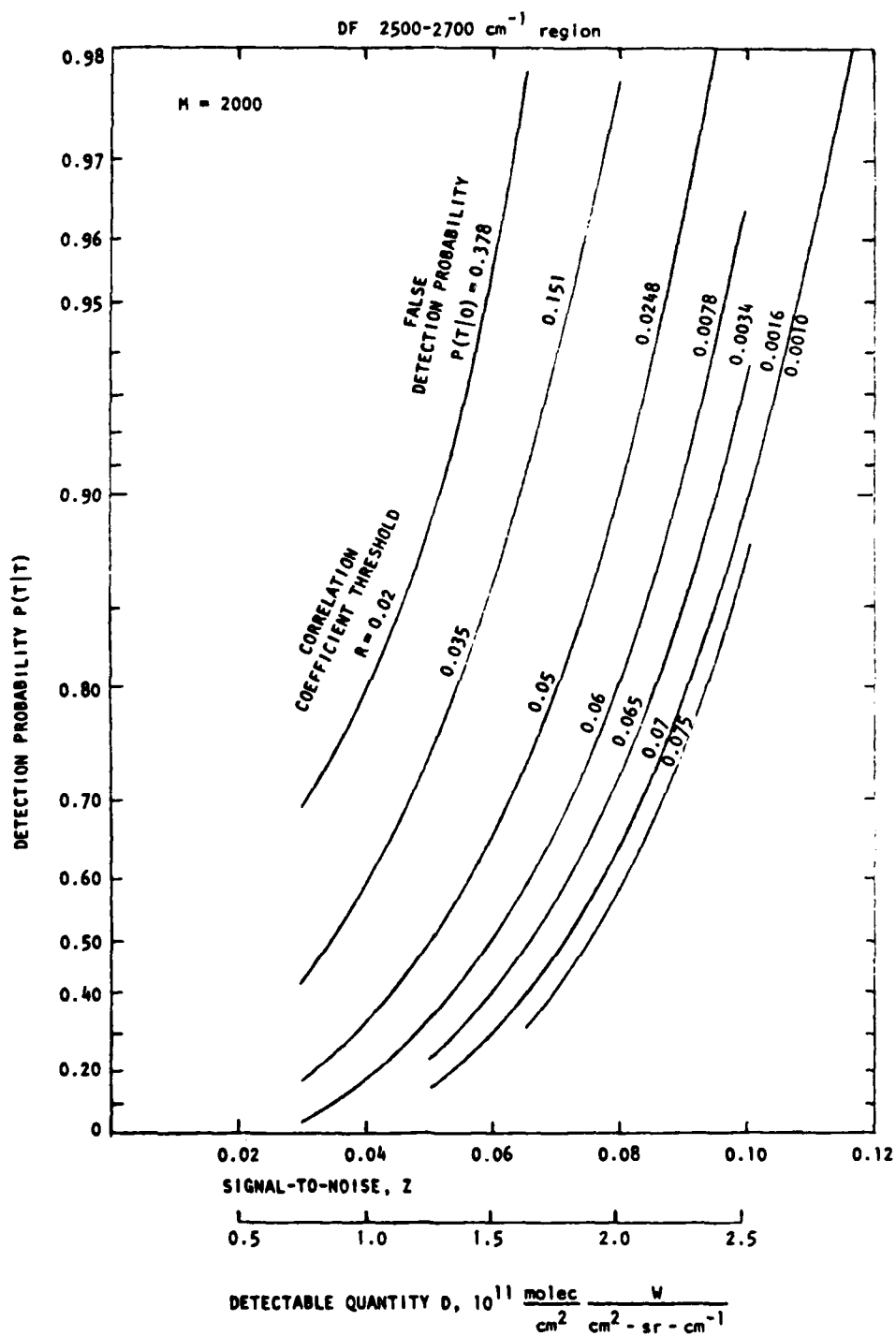


Table 7 Detection Parameters for DF 2500-2700 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2500-2700	cm^{-1}
Approximate wavelength	3.85	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	2.81×10^{14}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu} a_{\nu}$	C _{MAX} = 2.62×10^{-19}	cm^2/molec
Mean contrast	$\mu' = 2.86 \times 10^{-22}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 6.38 \times 10^{-21}$	cm^2/molec
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* Photon flux density on detector		
* from scene	6.4×10^{12}	phot/sec cm^2
* from internal sources	6.8×10^{12}	phot/sec cm^2
* TOTAL	$J = 1.3 \times 10^{13}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.9×10^{12}	$\text{cm} \sqrt{\text{Hz/W}}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 1.02$	sec
* CORRESPONDING BASELINE NESR	$(\text{NESR})_0 = 1.1 \times 10^{-8}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 0.8 - 2.3 \times 10^{11}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 5.6 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



OF 2700-2900 cm^{-1} region

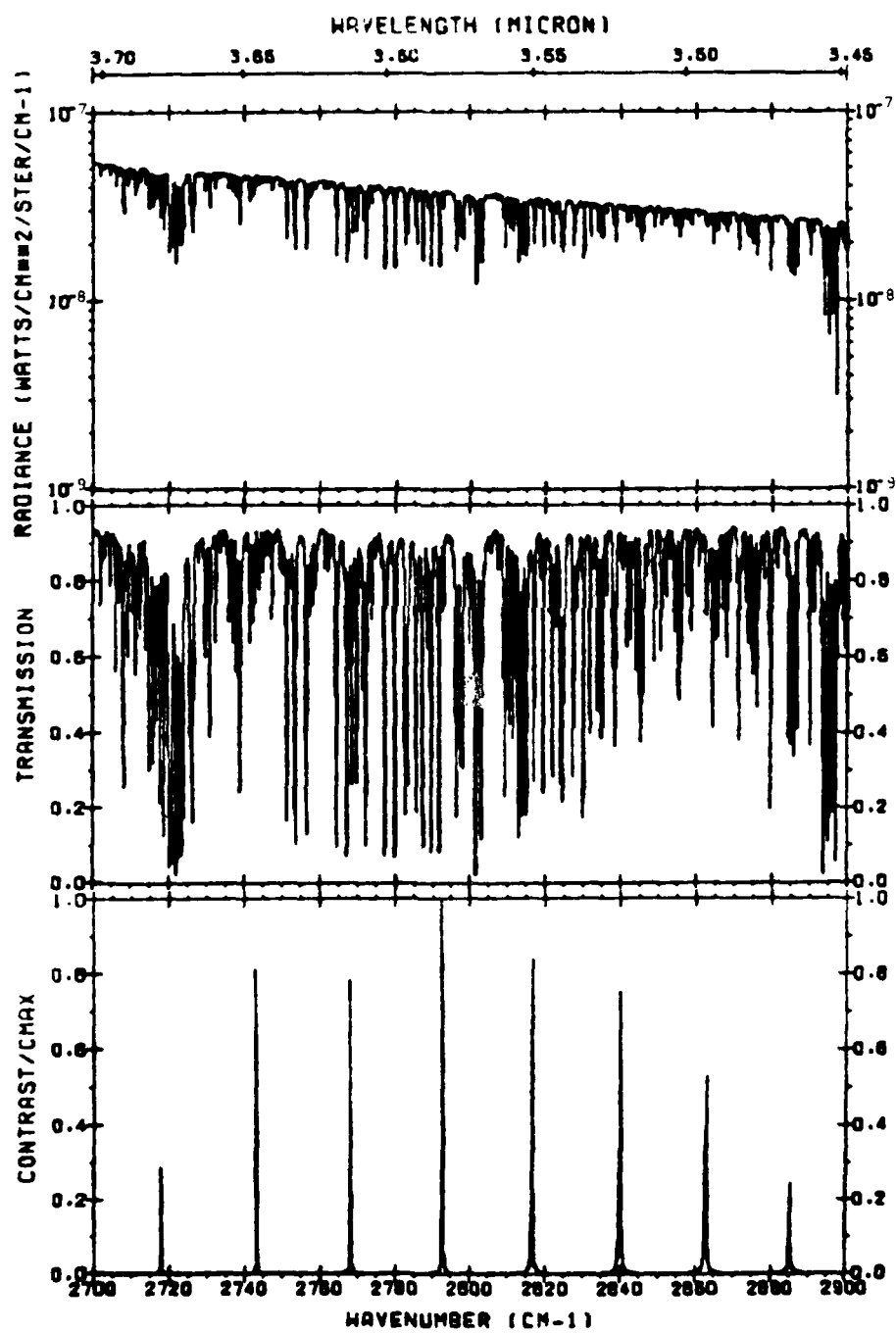
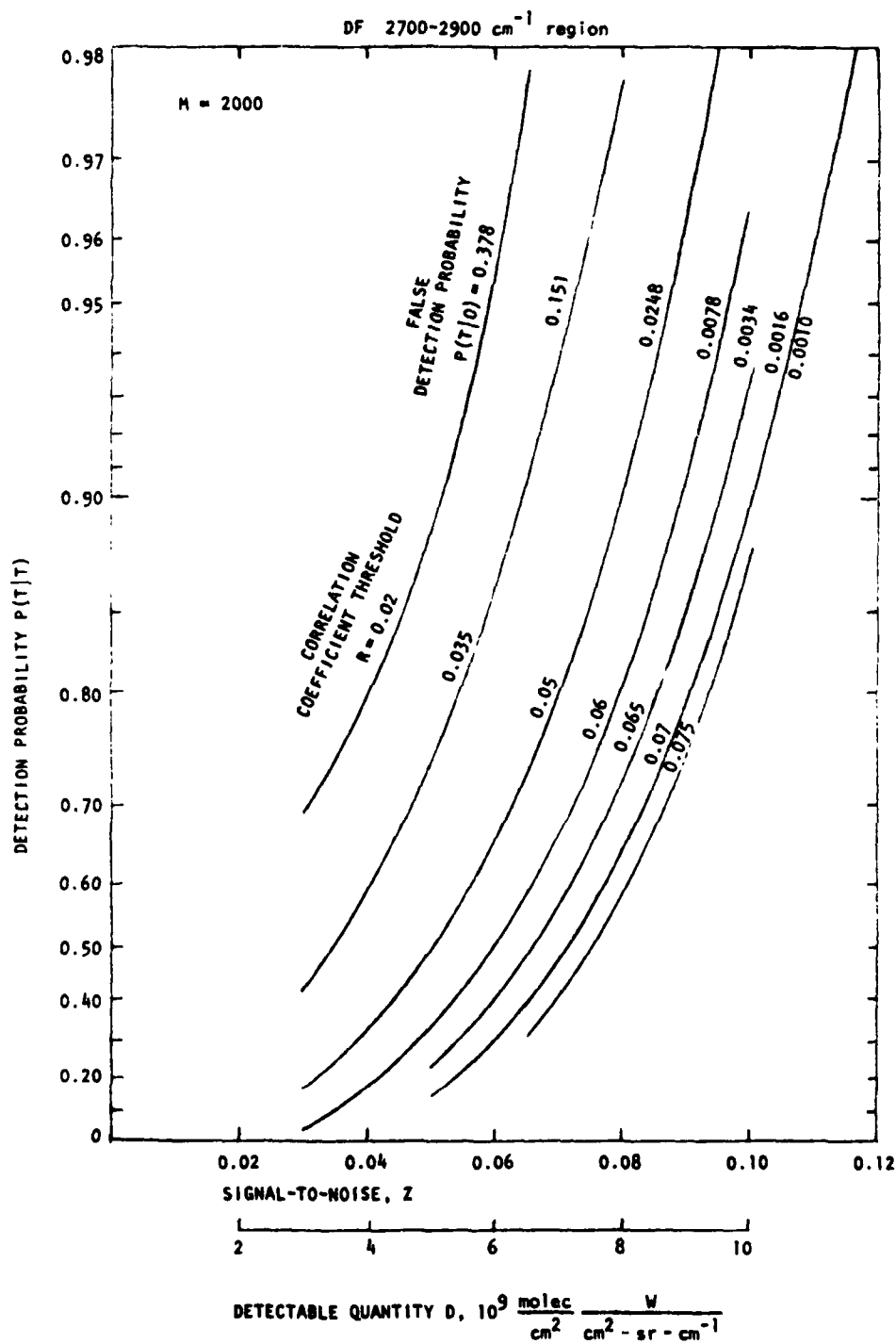


Table 8 Detection Parameters for DF 2700-2900 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2700-2900	cm^{-1}
Approximate wavelength	3.57	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	1.23×10^{14}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_v \alpha_{gv}$	C MAX = 1.66×10^{-18}	cm^2/molec
Mean contrast	$\mu' = 1.45 \times 10^{-20}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 9.39 \times 10^{-20}$	cm^2/molec
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* Photon flux density on detector		
* from scene	2.8×10^{12}	phot/sec cm^2
* from internal sources	3.0×10^{12}	phot/sec cm^2
* TOTAL	J = 5.8×10^{12}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	2.7×10^{12}	$\text{cm } \sqrt{\text{Hz/W}}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 1.53$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 6.6 \times 10^{-9}$	$\text{W/cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $3.0 - 9.0 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 2.2 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$



OF 2900-3000 cm^{-1} region

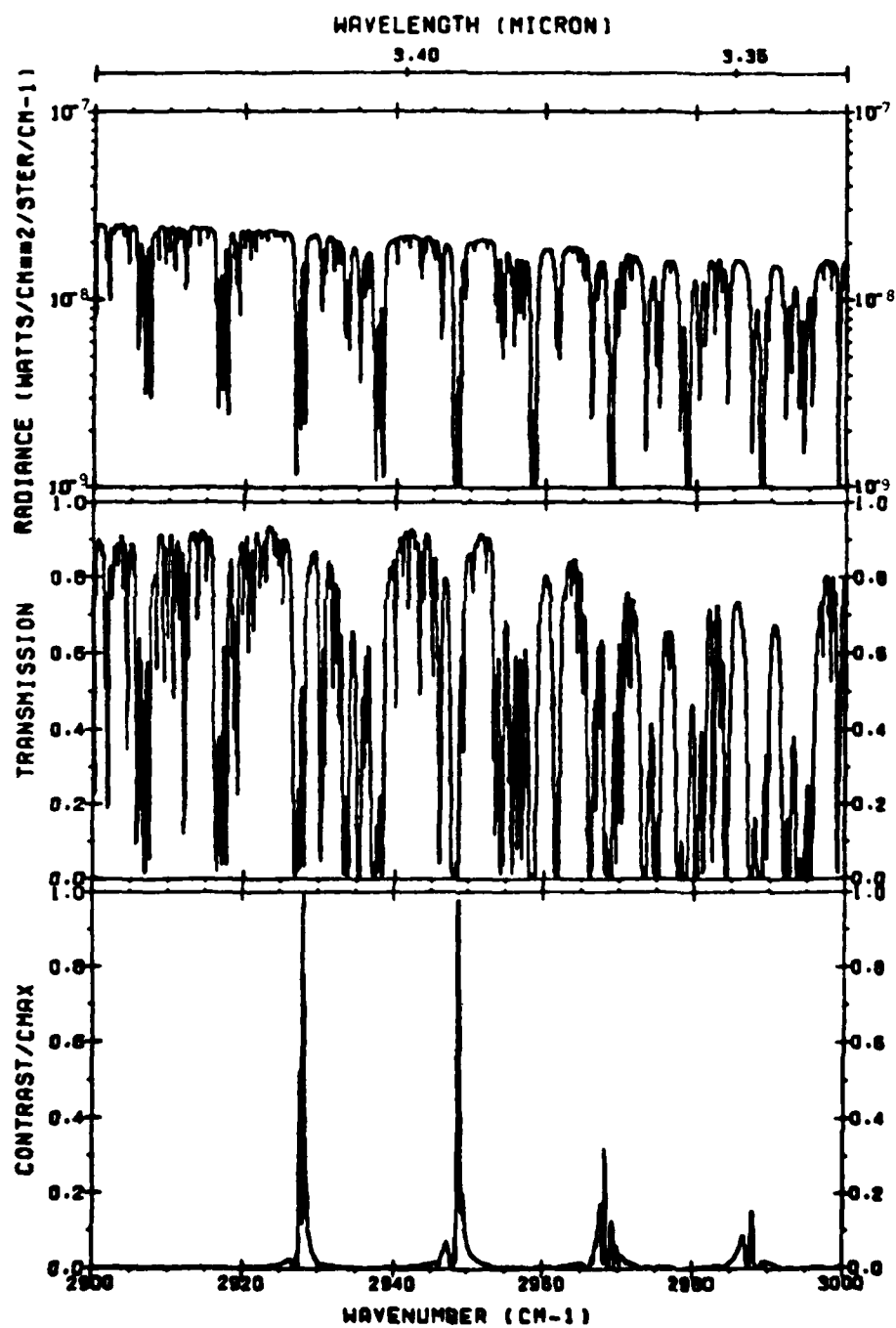
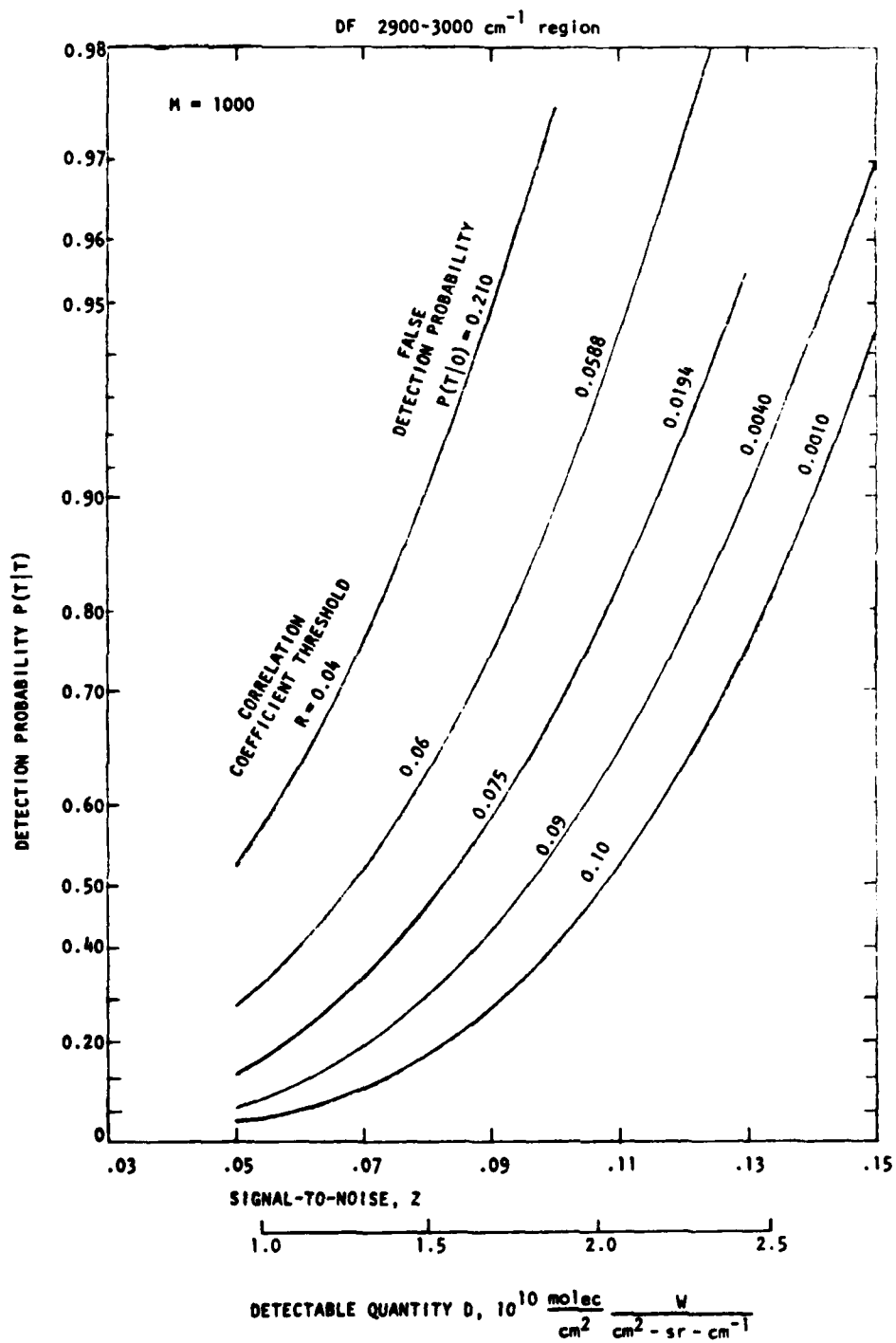


Table 9 Detection Parameters for DF 2900-3000 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2900-3000	cm^{-1}
Approximate wavelength	3.39	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 1000	
BAND PHOTON RADIANCE (scene)	2.56×10^{13}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu} \alpha_{\text{gv}}$	C _{MAX} = 2.39×10^{-19}	cm^2/molec
Mean contrast	$\mu' = 4.34 \times 10^{-21}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.80 \times 10^{-20}$	cm^2/molec
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* Photon flux density on detector		
* from scene	5.8×10^{11}	phot/sec cm^2
* from internal sources	8.0×10^{11}	phot/sec cm^2
* TOTAL	$J = 1.4 \times 10^{12}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	5.2×10^{12}	$\text{cm } \sqrt{\text{Hz}}/\text{W}$
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* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 3.09$	sec
* CORRESPONDING BASELINE NESR	$(\text{NESR})_0 = 2.4 \times 10^{-9}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 1.0 - 2.3 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 5.8 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



HBr 2450-2650 cm^{-1} region

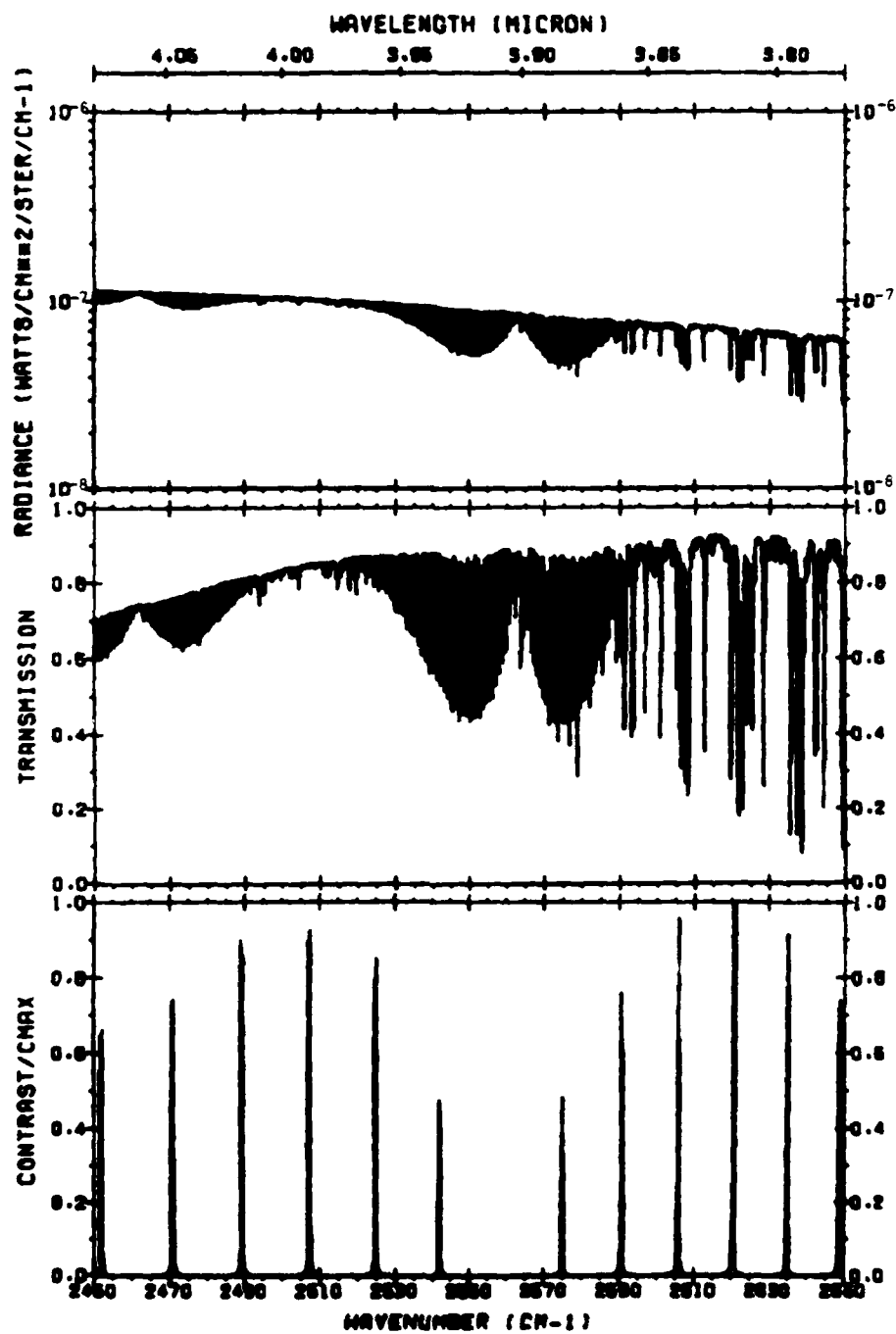
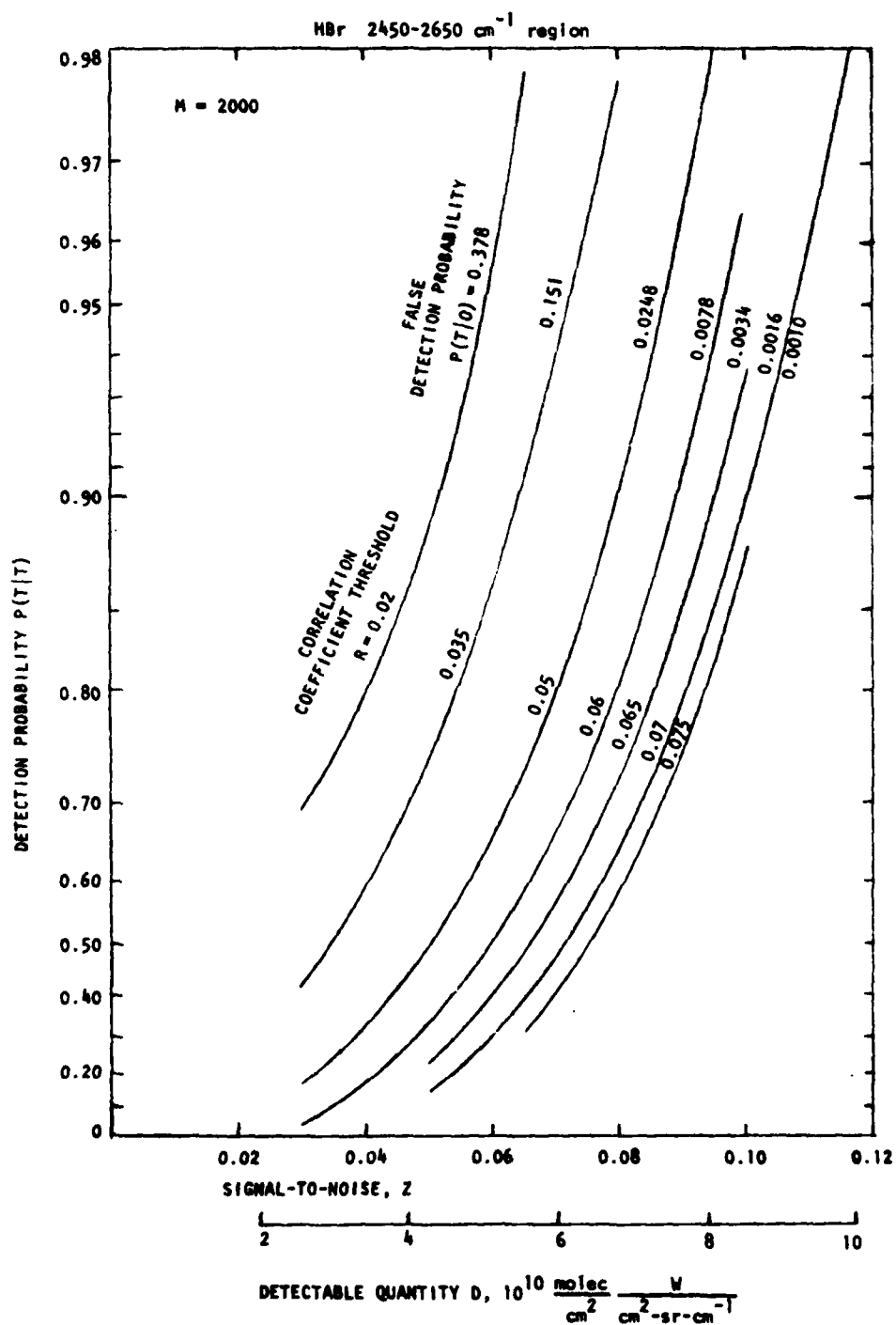


Table 10 Detection Parameters for HBr 2450-2650 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2450-2650	cm^{-1}
Approximate wavelength	3.9	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	3.39×10^{14}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu} \sigma_{\text{gv}}$	C _{MAX} = 2.48×10^{-19}	cm^2/molec
Mean contrast.	$\mu' = 4.19 \times 10^{-21}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 2.10 \times 10^{-20}$	cm^2/molec
* Photon flux density on detector		
* from scene.	7.7×10^{12}	phot/sec cm^2
* from internal sources	8.2×10^{12}	phot/sec cm^2
* TOTAL	J = 1.6×10^{13}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.8×10^{12}	$\text{cm } \sqrt{\text{Hz/W}}$
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE		
	min $t_d = 0.930$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.3 \times 10^{-8}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $3.0 - 8.0 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_{D'} = 1.9 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



HCl 2500-2700 cm^{-1} region

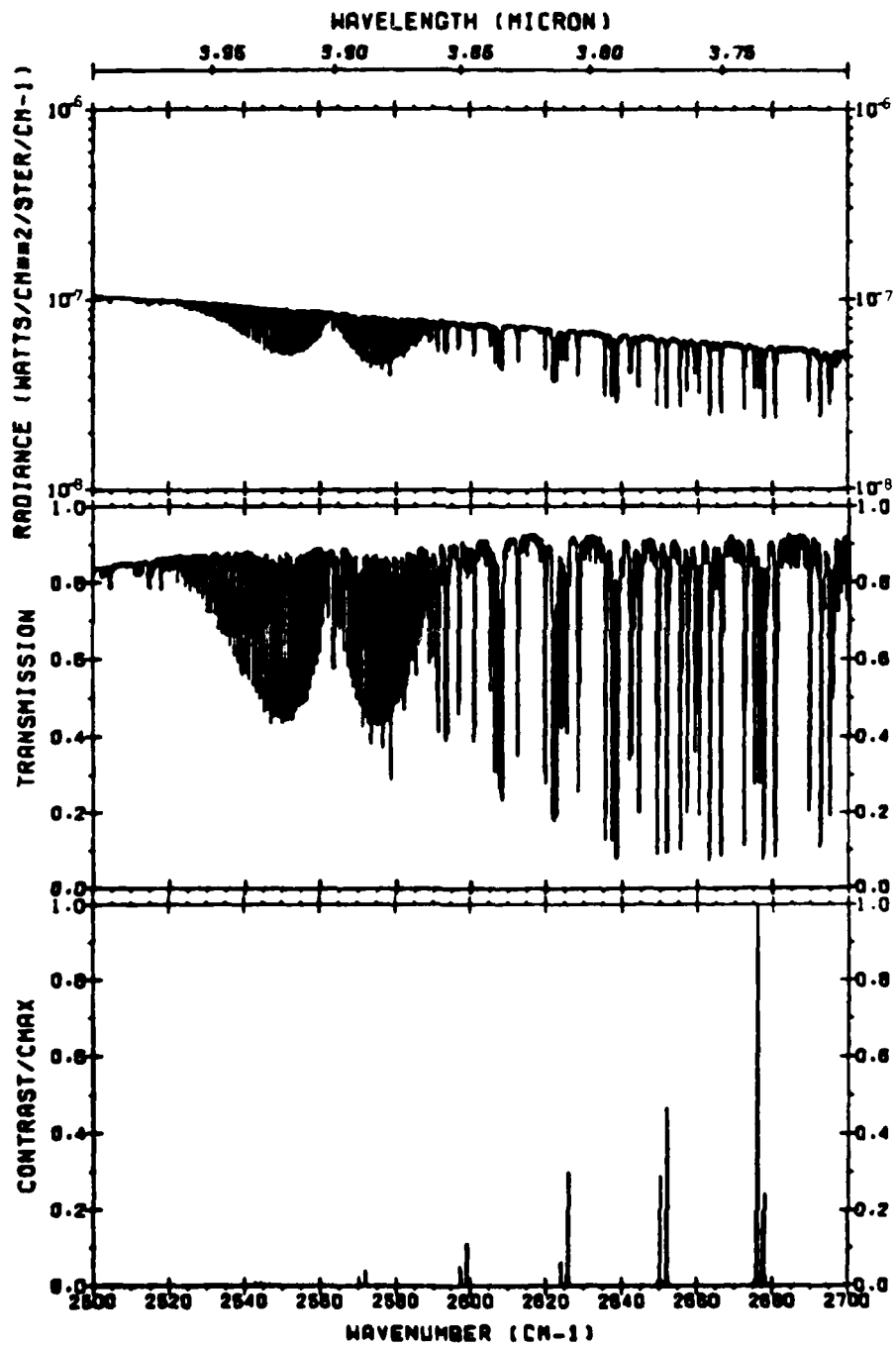
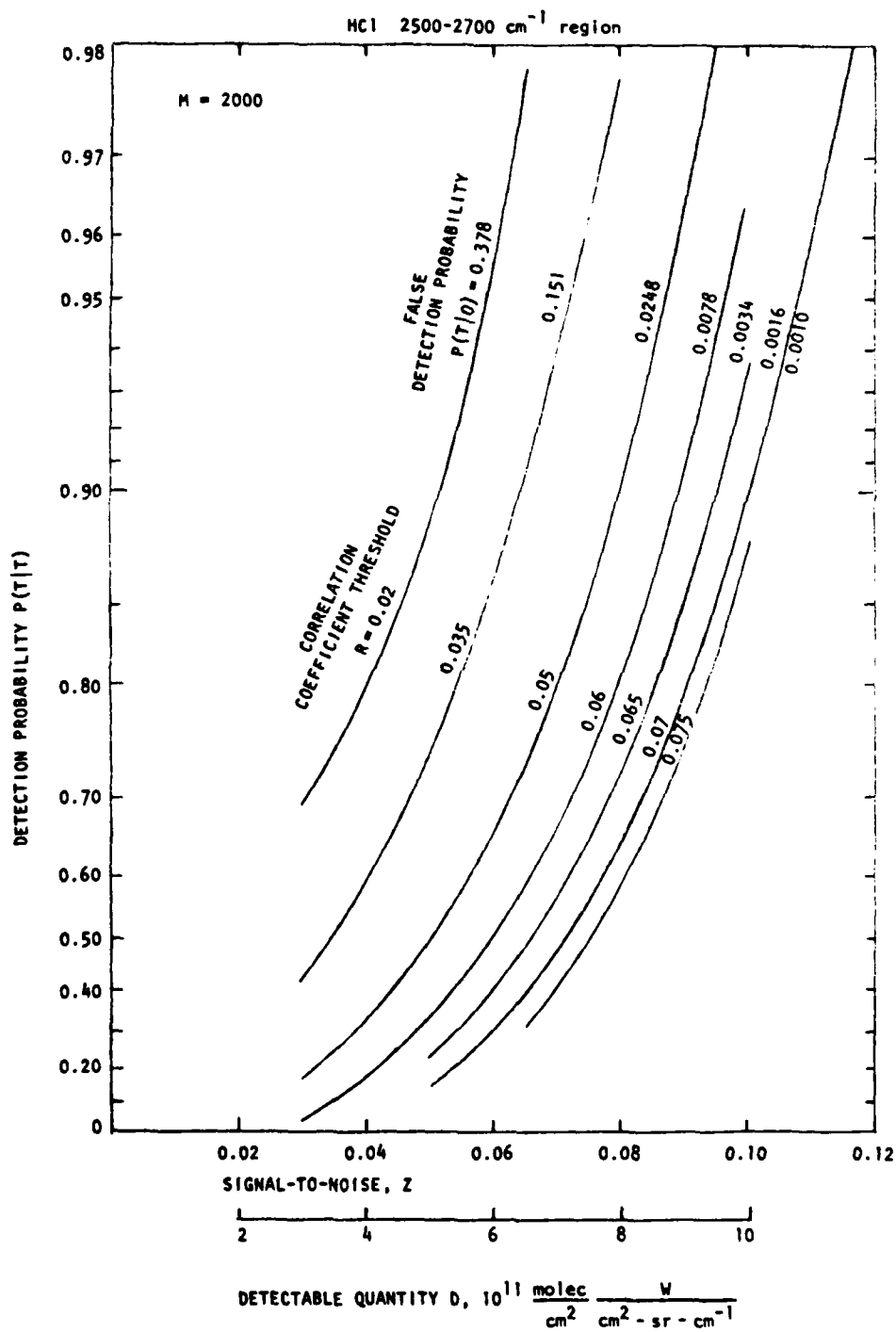


Table 11 Detection Parameters for HCl 2500-2700 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2500-2700	cm^{-1}
Approximate wavelength	3.85	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	$M = 2000$	
BAND PHOTON RADIANCE (scene)	2.81×10^{14}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu}^{\alpha_{\text{gv}}}$	$\text{CMAX} = 7.11 \times 10^{-20}$	cm^2/molec
Mean contrast.	$\mu' = 1.16 \times 10^{-22}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.57 \times 10^{-21}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene.	6.4×10^{12}	phot/sec cm^2
* from internal sources	6.8×10^{12}	phot/sec cm^2
* TOTAL	$J = 1.3 \times 10^{13}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.9×10^{12}	$\text{cm } \sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR RLIP PERFORMANCE	$\min t_d = 1.02$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.1 \times 10^{-8}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 3.0 - 9.0 \times 10^{11}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 2.3 \times 10^{11}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



HCl 2700-2900 cm^{-1} region

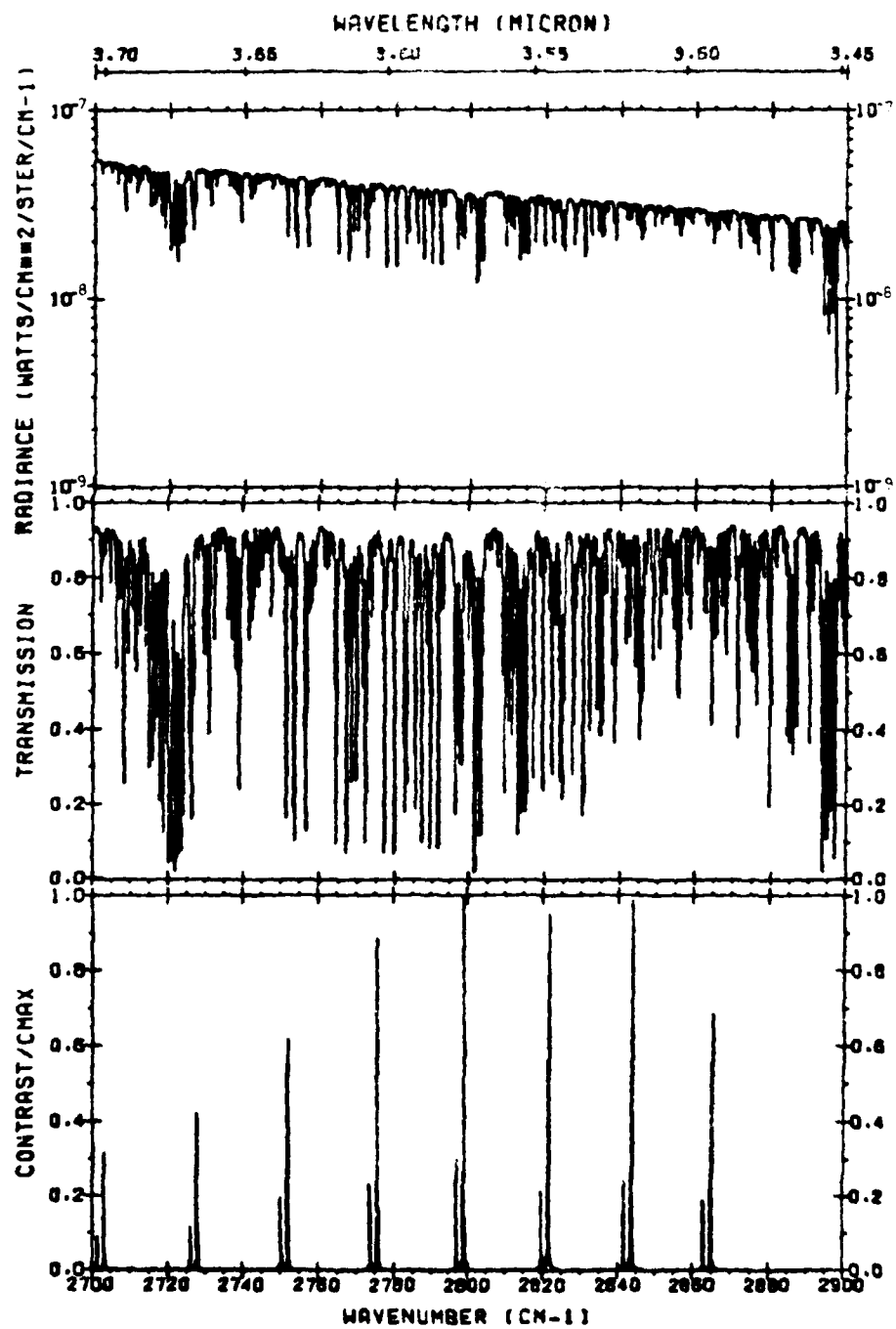
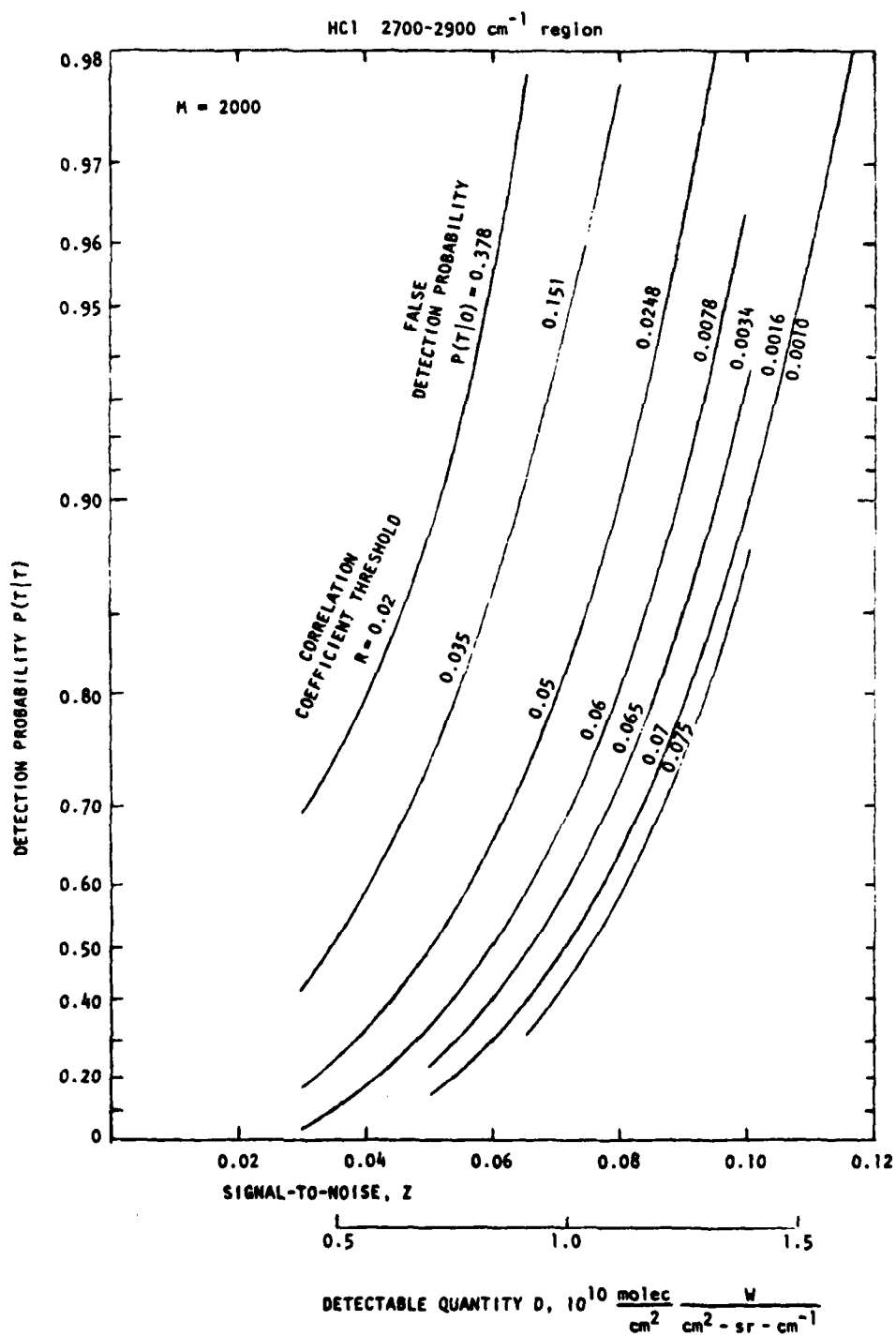


Table 12 Detection Parameters for HCl 2700-2900 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2700-2900	cm^{-1}
Approximate wavelength	3.57	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	1.23×10^{14}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_v \alpha_{gv}$	CMAX = 1.30×10^{-18}	cm^2/molec
Mean contrast.	$\mu' = 9.28 \times 10^{-21}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 6.77 \times 10^{-20}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene.	2.8×10^{12}	phot/sec cm^2
* from internal sources	3.0×10^{12}	phot/sec cm^2
* TOTAL	J = 5.8×10^{12}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	2.7×10^{12}	$\text{cm } \sqrt{\text{Hz}}/\text{W}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 1.53$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 6.6 \times 10^{-9}$	$\text{W/cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $0.5 - 1.25 \times 10^{10}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 3.1 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$



HCl 2900-3000 cm^{-1} region

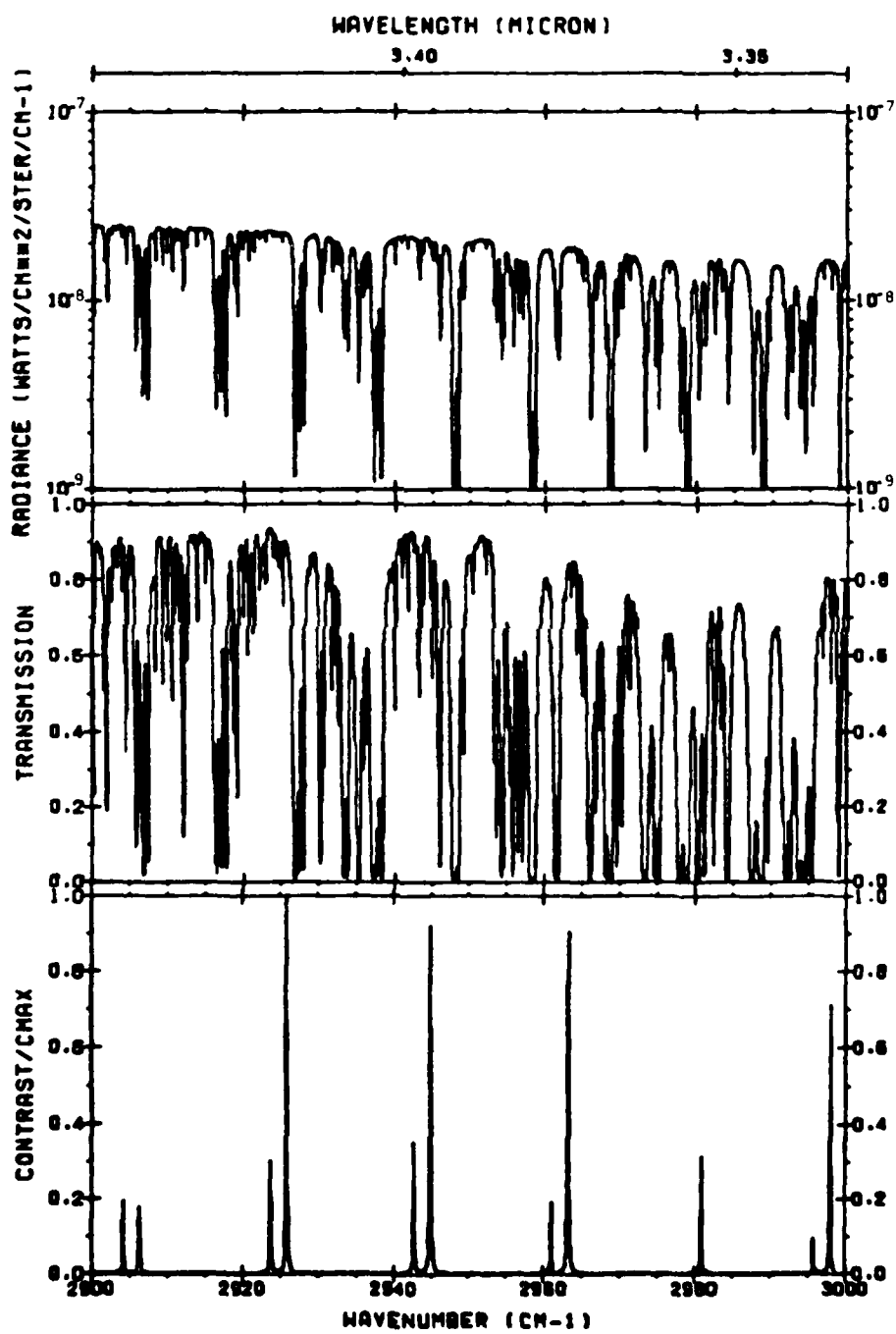
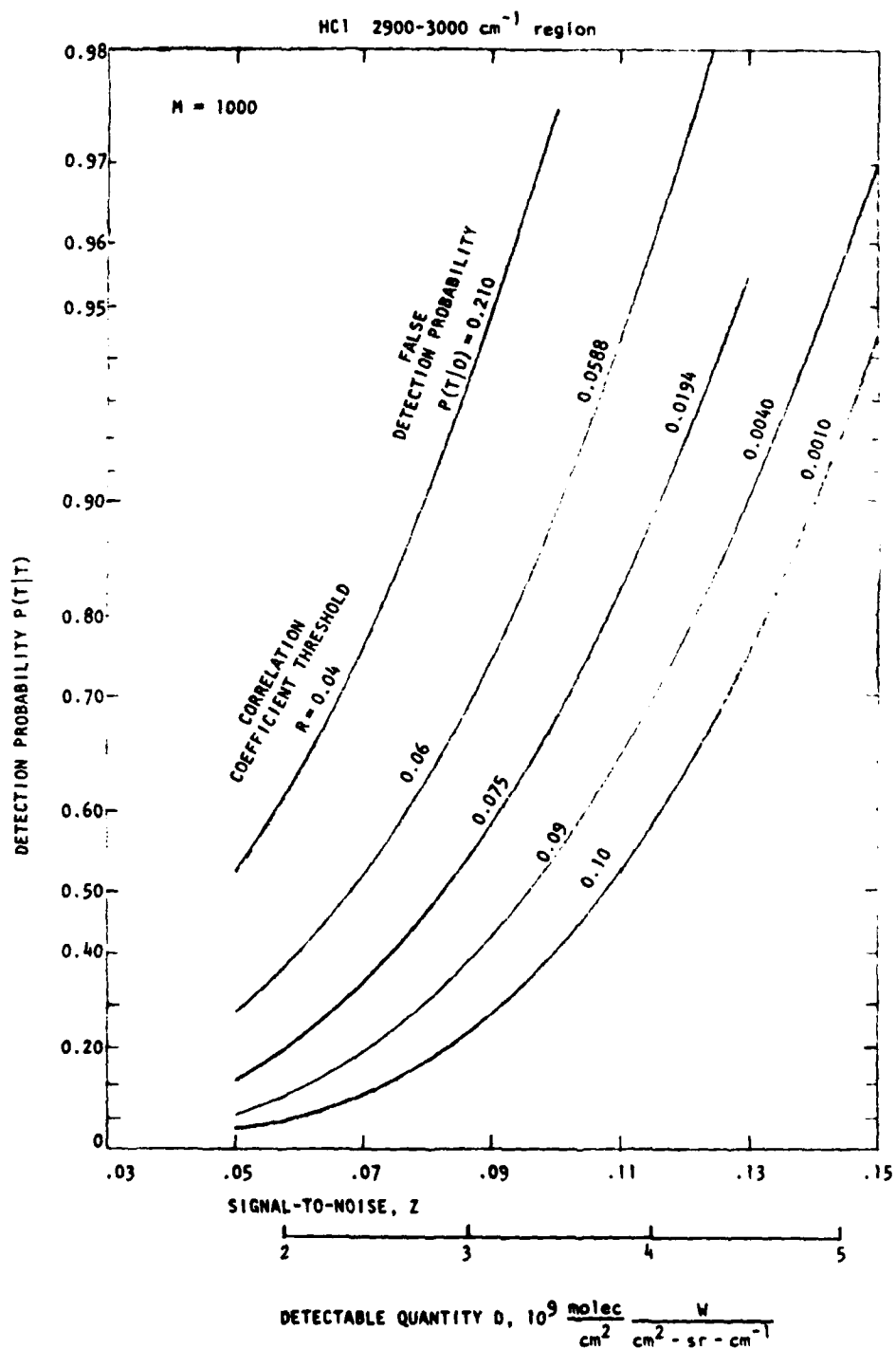


Table 13 Detection Parameters for HCl 2900-3000 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2900-3000	cm^{-1}
Approximate wavelength	3.39	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 1000	
BAND PHOTON RADIANCE (scene)	2.56×10^{13}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu}^{\alpha_{\text{gv}}}$	C _{MAX} = 1.64×10^{-18}	cm^2/molec
Mean contrast.	$\mu' = 1.64 \times 10^{-20}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 9.81 \times 10^{-20}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene.	5.8×10^{11}	phot/sec cm^2
* from internal sources	8.0×10^{11}	phot/sec cm^2
* TOTAL	$J = 1.4 \times 10^{12}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	5.2×10^{12}	$\text{cm} \sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_D = 3.09$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 2.4 \times 10^{-9}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 2.0 - 4.5 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 1.1 \times 10^9$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{sr cm}^{-1})$



HF 3240-3440 cm^{-1} region

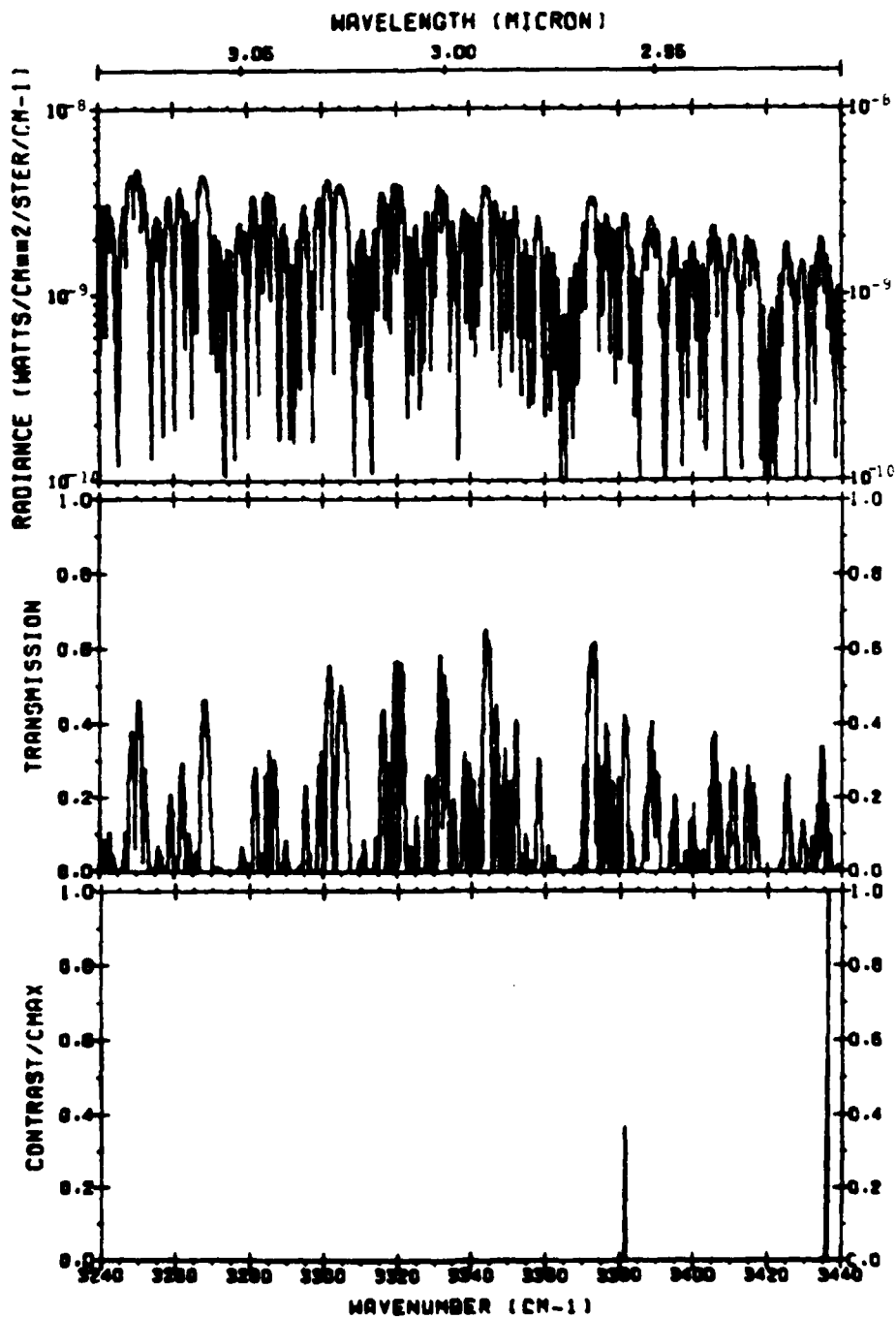
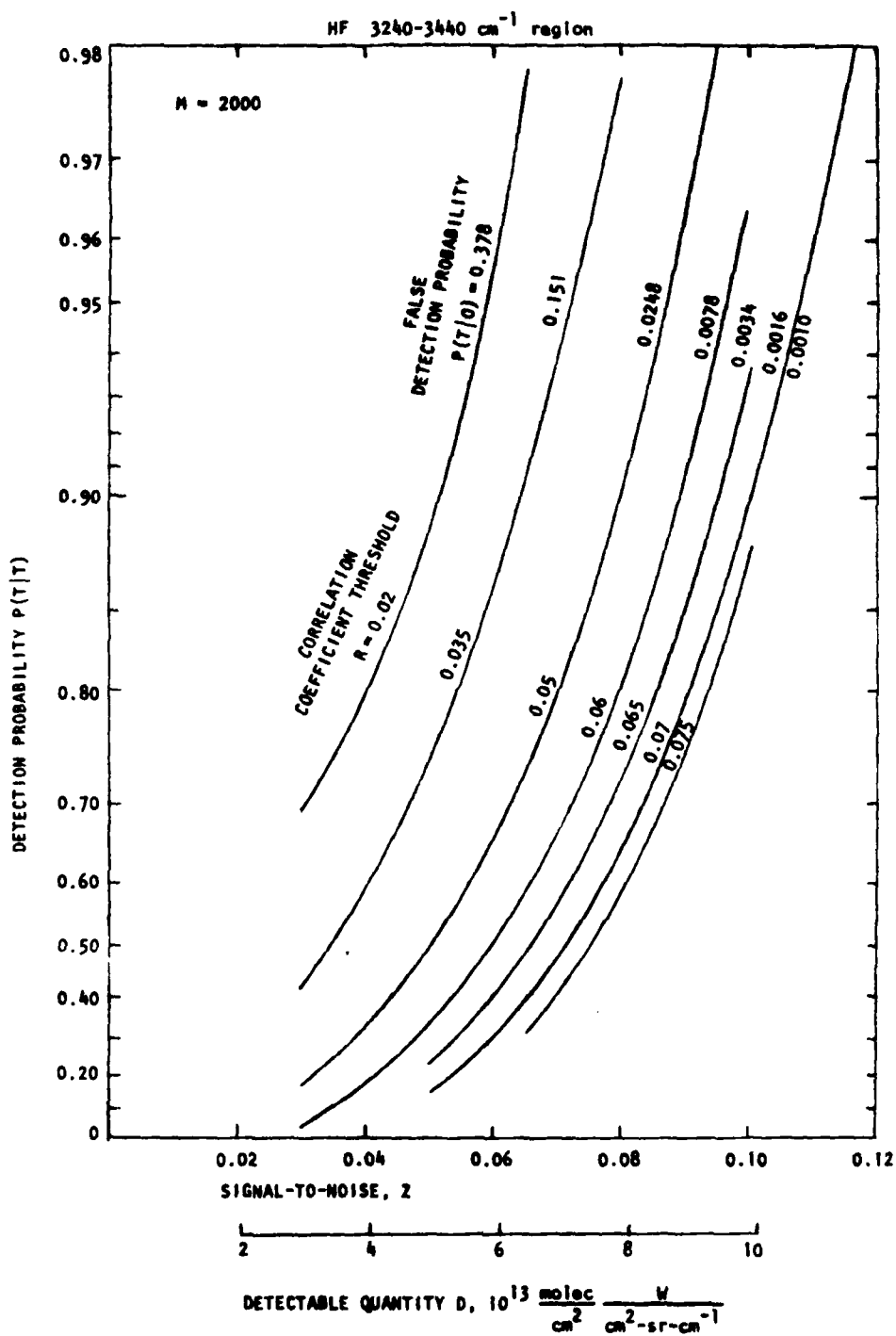


Table 14 Detection Parameters for HF 3240-3440 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	3240-3440	cm^{-1}
Approximate wavelength	3.0	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 2000	
BAND PHOTON RADIANCE (scene)	5.46×10^{12}	$\text{ph/sec cm}^2 \text{sr}$
Maximum of contrast $\tau_{\nu} \alpha_{\text{gv}}$	C _{MAX} = 9.62×10^{-23}	cm^2/molec
Mean contrast	$\mu' = 5.70 \times 10^{-26}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.72 \times 10^{-24}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene	1.2×10^{11}	phot/sec cm^2
* from internal sources	3.2×10^{11}	phot/sec cm^2
* TOTAL	$J = 4.5 \times 10^{11}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	8.0×10^{12}	$\text{cm } \sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 5.52$	sec
* CORRESPONDING BASELINE NESR	$(\text{NESR})_0 = 1.2 \times 10^{-9}$	$\text{W/cm}^2 \text{sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 3.0 - 9.0 \times 10^{13}$	$(\text{molec/cm}^2)(\text{W/cm}^2 \text{sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 2.1 \times 10^{13}$	$(\text{molec/cm}^2)(\text{W/cm}^2 \text{sr cm}^{-1})$



HI 2100-2200 cm^{-1} region

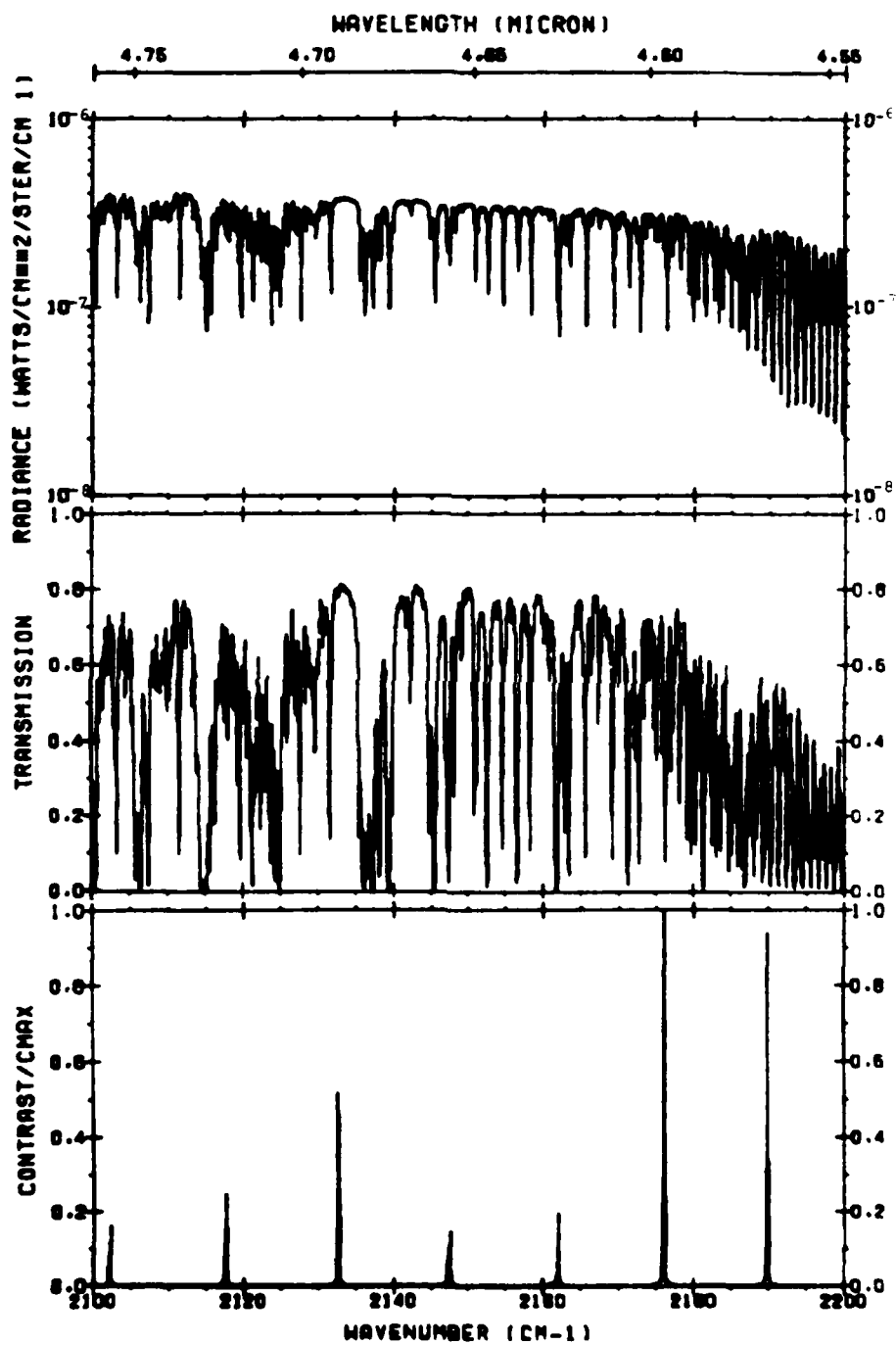
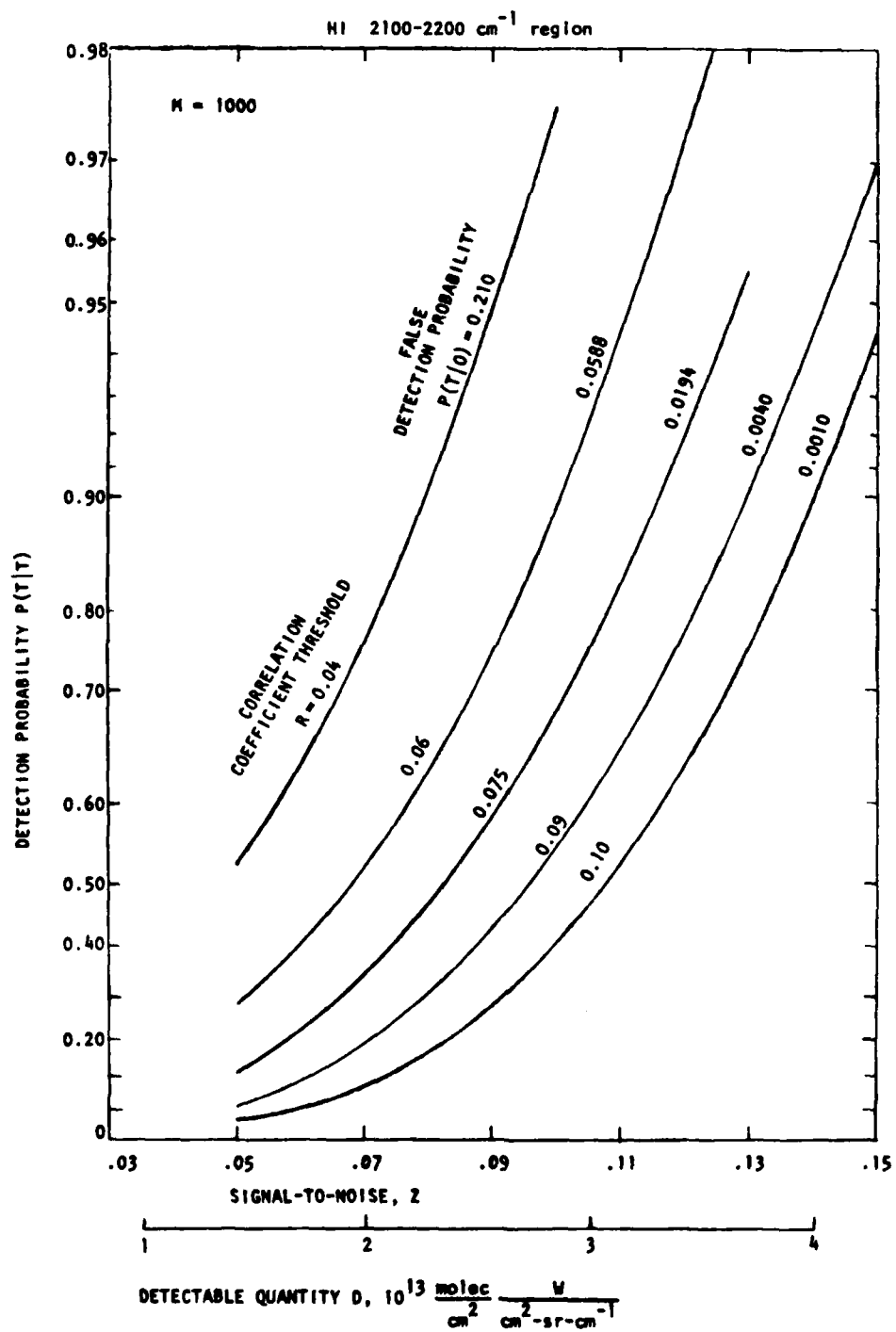


Table 15 Detection Parameters for HI 2100-2200 cm^{-1} region

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2100-2200	cm^{-1}
Approximate wavelength	4.65	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 1000	
BAND PHOTON RADIANCE (scene)	6.19×10^{14}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_{\nu}^{\alpha}_{\text{gv}}$	CMAX = 2.13×10^{-21}	cm^2/molec
Mean contrast.	$\mu' = 1.17 \times 10^{-23}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 9.51 \times 10^{-23}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene.	1.4×10^{13}	phot/sec cm^2
* from internal sources	2.0×10^{13}	phot/sec cm^2
* TOTAL	J = 3.4×10^{13}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.4×10^{12}	$\text{cm } \sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 0.629$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.9 \times 10^{-8}$	$\text{W/cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 1.5 - 3.5 \times 10^{13}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 8.9 \times 10^{12}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$



HNO_3 $2\nu_9$ band

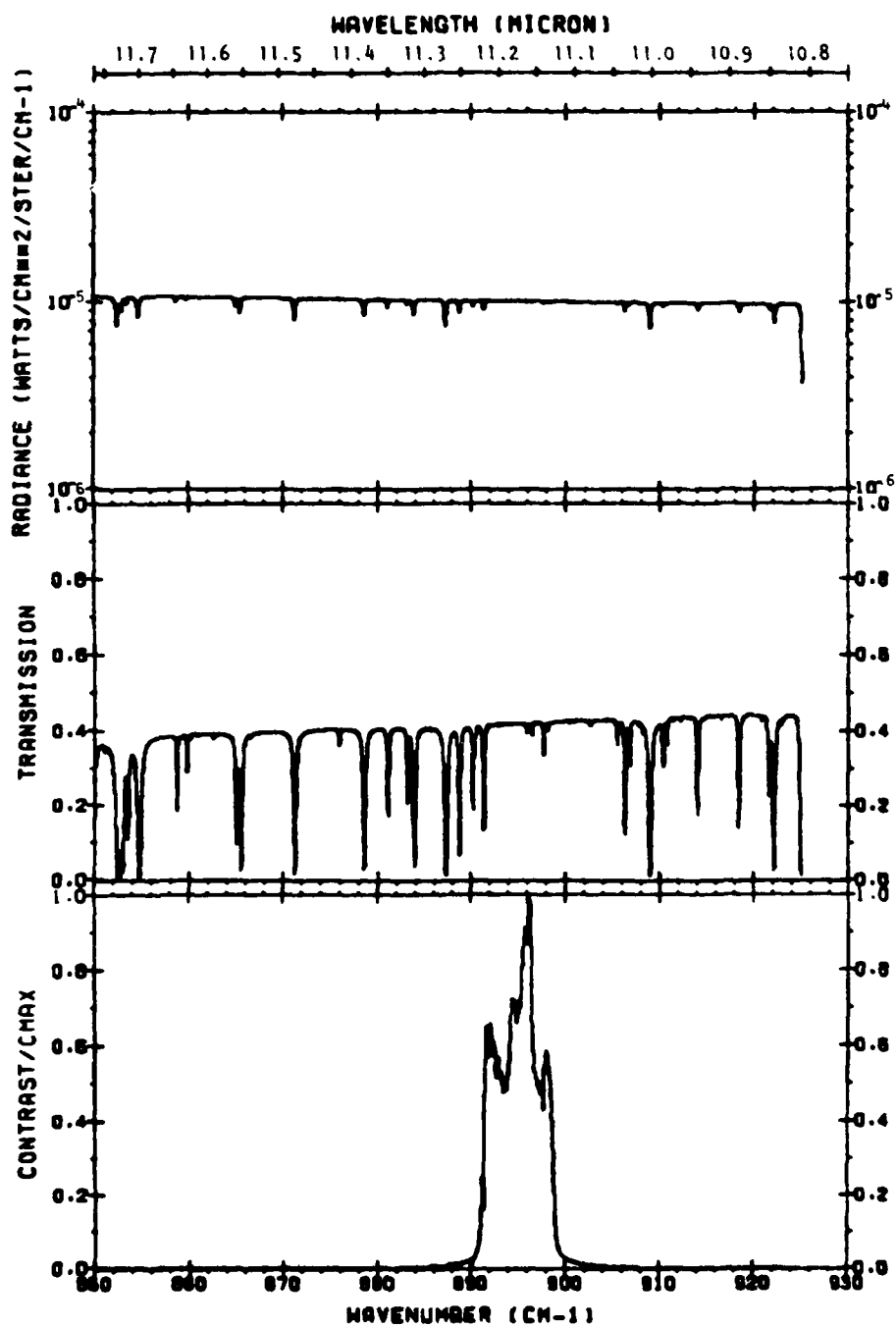
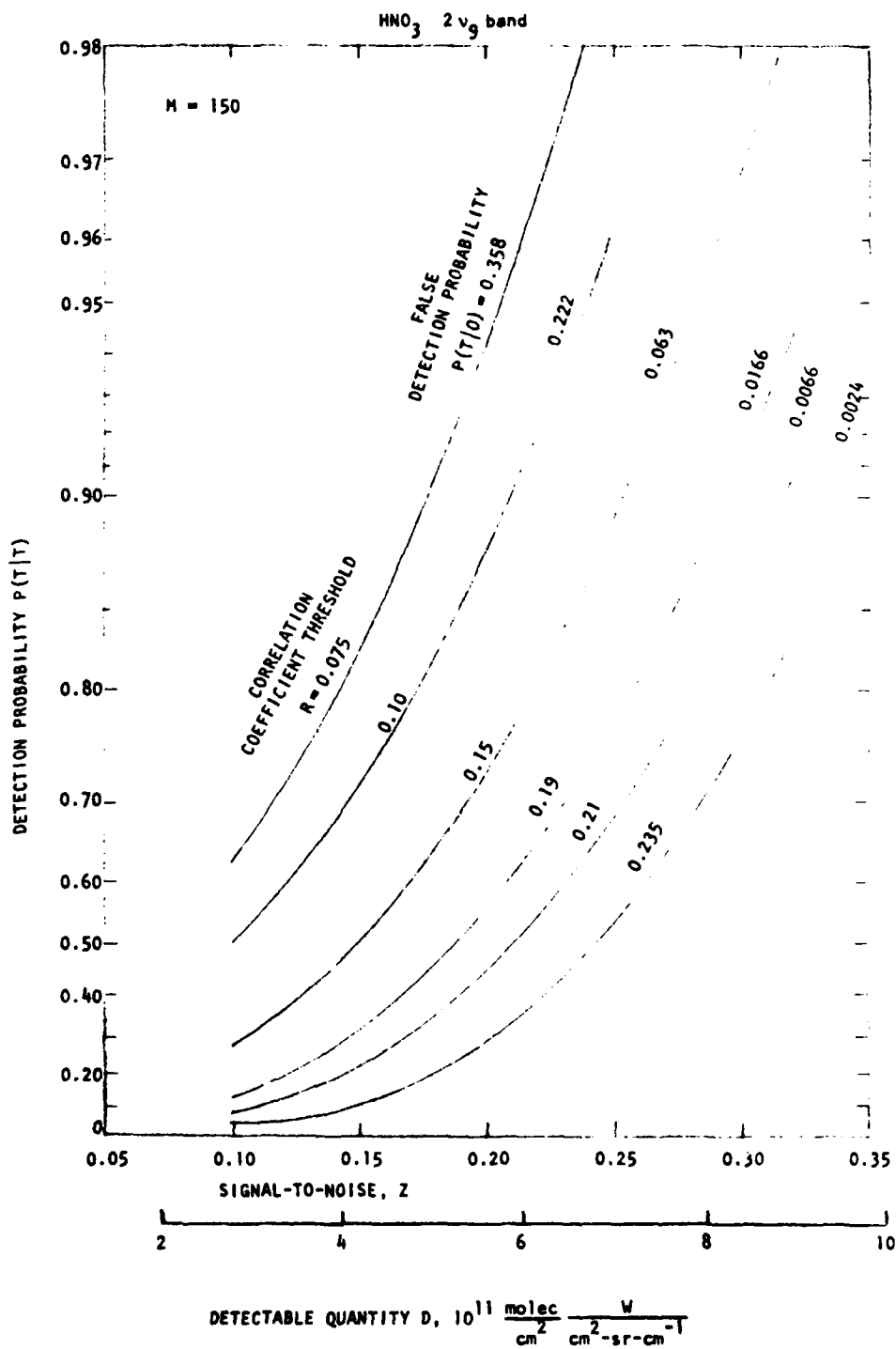


Table 16 Detection Parameters for HNO_3 $2\nu_g$ band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	887.5-902.5	cm^{-1}
Approximate wavelength	11.2	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 150	
BAND PHOTON RADIANCE (scene)	8.61×10^{15}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_{\nu g\nu}$	C _{MAX} = 1.66×10^{-19}	cm^2/molec
Mean contrast	$\mu' = 5.38 \times 10^{-20}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 6.98 \times 10^{-20}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene	2.0×10^{14}	phot/sec cm^2
* from internal sources	2.1×10^{14}	phot/sec cm^2
* TOTAL	J = 4.1×10^{14}	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	1.2×10^{12}	$\text{cm } \sqrt{R_z}/W$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 1.82 \times 10^{-2}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 1.4 \times 10^{-7}$	$W/\text{cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 3.0 - 8.0 \times 10^{11}$	$(\text{molec/cm}^2) (W/\text{cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_{D'} = 1.8 \times 10^{11}$	$(\text{molec/cm}^2) (W/\text{cm}^2 \text{ sr cm}^{-1})$



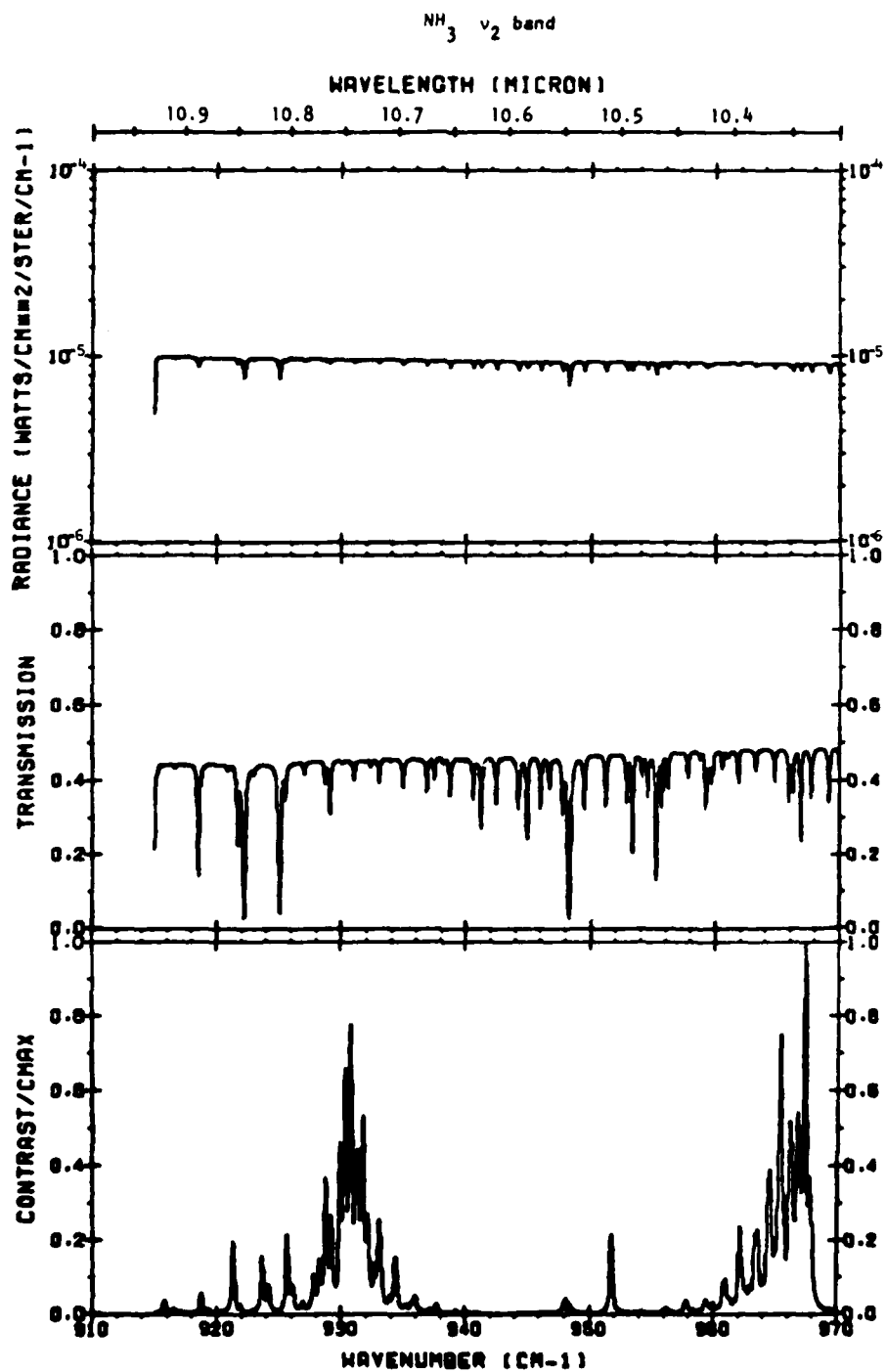
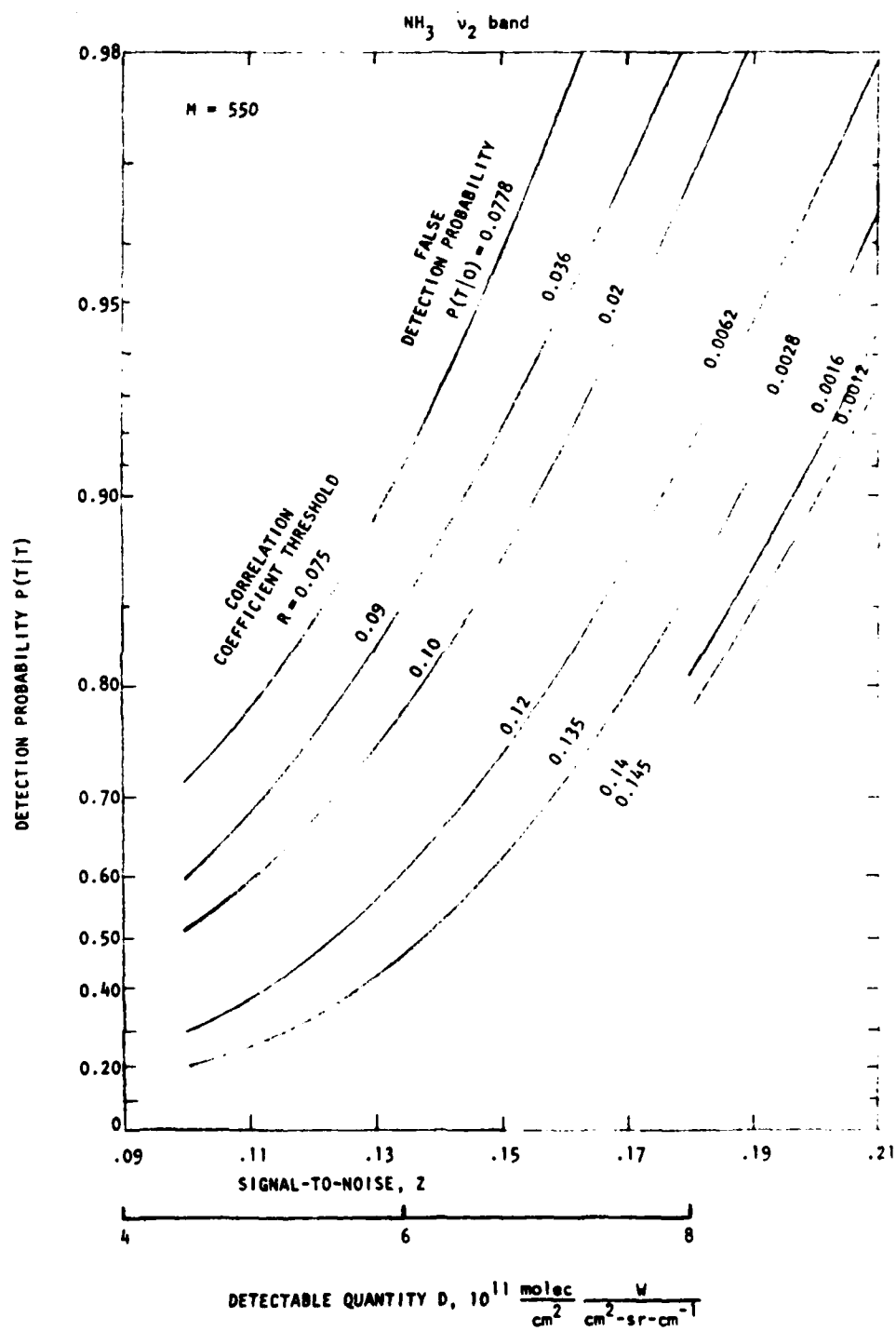


Table 17 Detection Parameters for NH_3 ν_2 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	915-970	cm^{-1}
Approximate wavelength	10.7	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 550	
BAND PHOTON RADIANCE (scene)	2.75×10^{16}	$\text{ph/sec cm}^2 \text{ sr}$
Maximum of contrast $\tau_{\nu}^{\alpha}_{\text{gv}}$	C MAX = 9.90×10^{-19}	cm^2/molec
Mean contrast.	$\mu' = 6.78 \times 10^{-20}$	cm^2/molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.30 \times 10^{-19}$	cm^2/molec
<hr/>		
* Photon flux density on detector		
* from scene.	6.3×10^{14}	phot/sec cm^2
* from internal sources	6.9×10^{14}	phot/sec cm^2
* TOTAL	$J = 1.3 \times 10^{15}$	phot/sec cm^2
* BLIP $D_{\lambda_c}^*$	6.2×10^{11}	$\text{cm } \sqrt{\text{Hz}}/\text{W}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 7.46 \times 10^{-3}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 4.1 \times 10^{-7}$	$\text{W/cm}^2 \text{ sr cm}^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 4.5 - 7.3 \times 10^{11}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 1.69 \times 10^{11}$	$(\text{molec/cm}^2) (\text{W/cm}^2 \text{ sr cm}^{-1})$



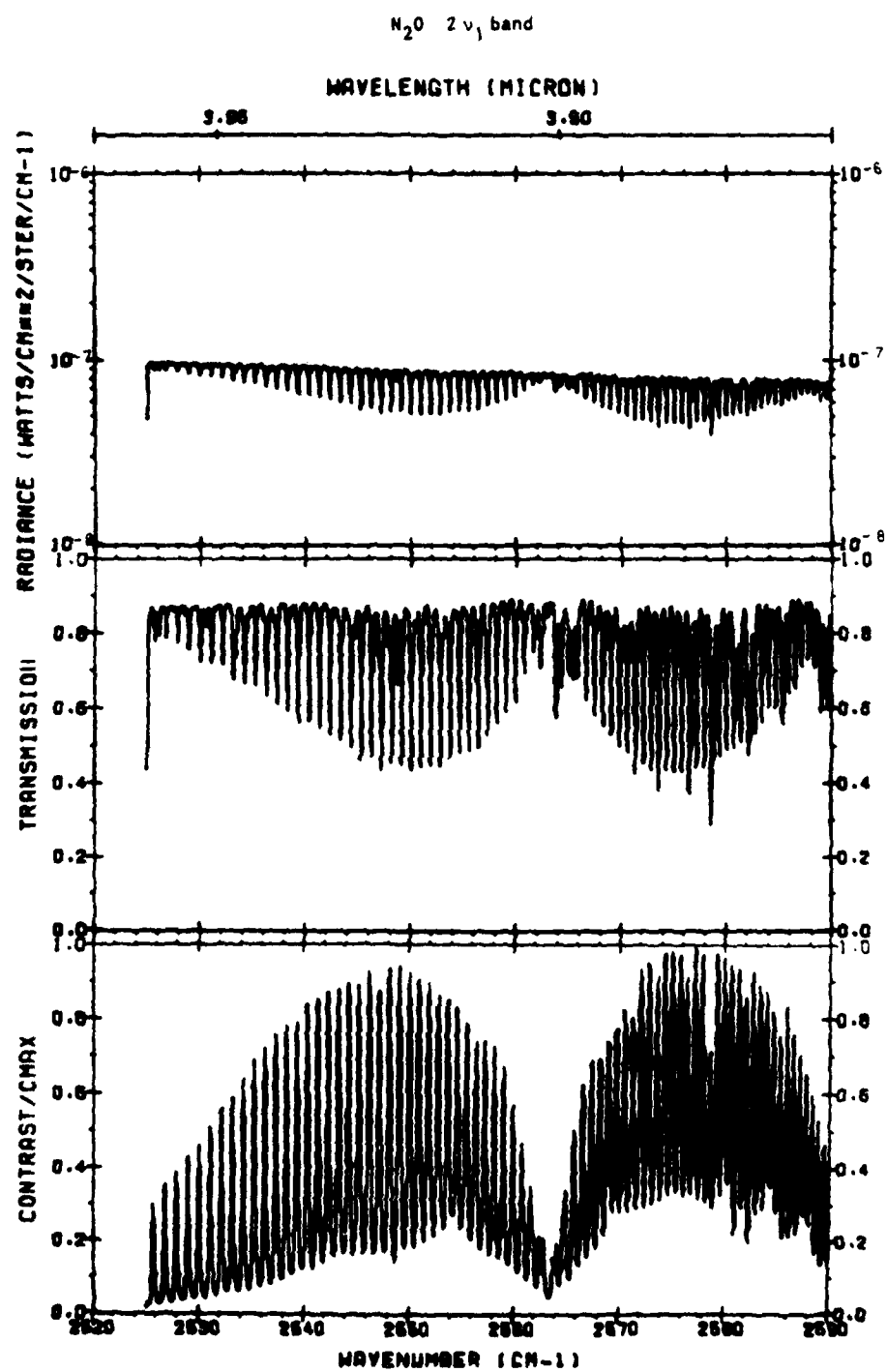
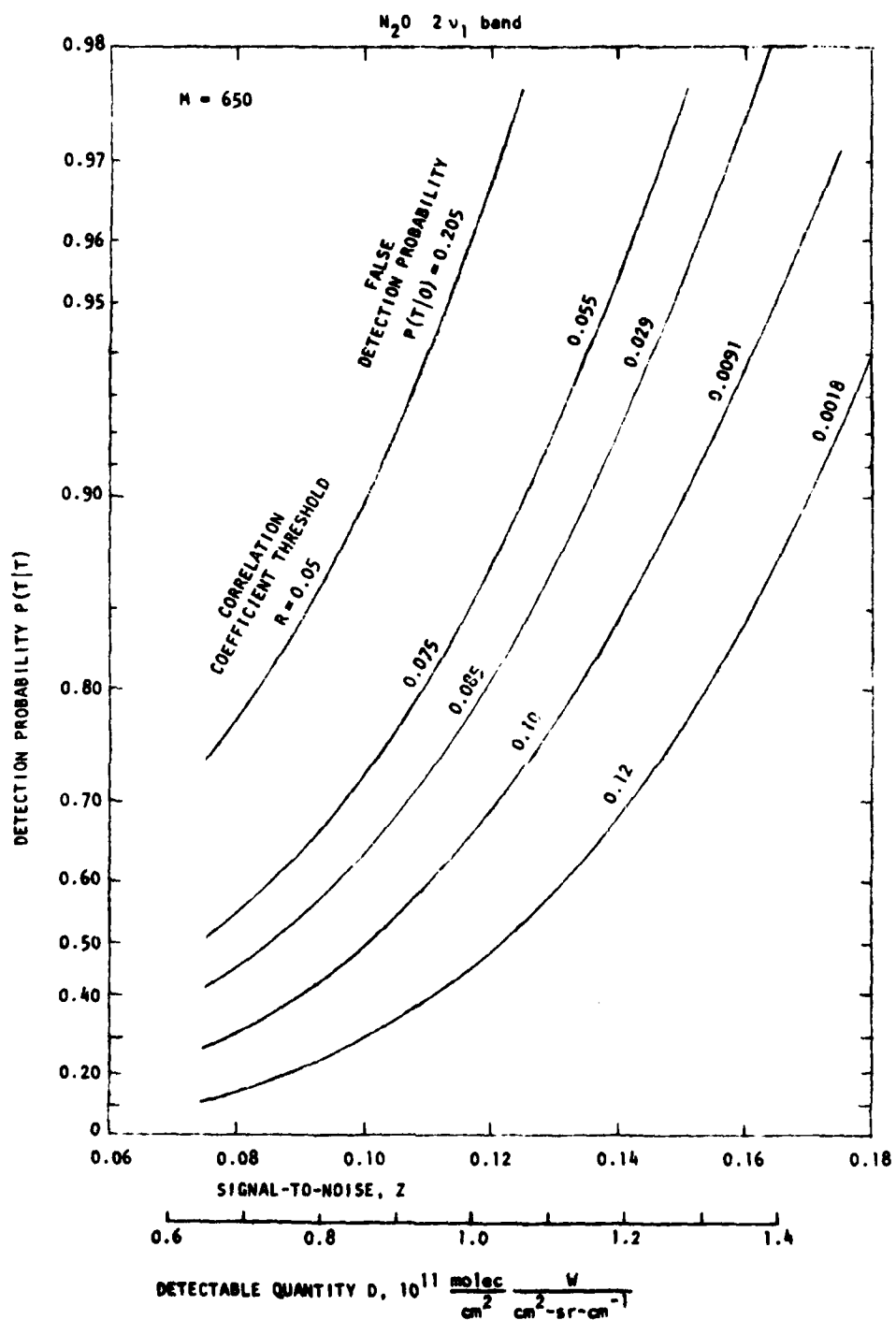


Table 18 Detection Parameters for N_2O $2\nu_1$ band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2525-2590	cm^{-1}
Approximate wavelength	4.0	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 650	
BAND PHOTON RADIANCE (scene)	1.04×10^{14}	ph/sec cm^2 sr
Maximum of contrast $\tau_{\nu} \alpha_{gv}$	C _{MAX} = 3.51×10^{-20}	$cm^2/molec$
Mean contrast.	$\mu' = 1.32 \times 10^{-20}$	$cm^2/molec$
STANDARD DEVIATION OF CONTRAST	$\sigma' = 8.95 \times 10^{-21}$	$cm^2/molec$
* Photon flux density on detector		
* from scene.	2.4×10^{12}	phot/sec cm^2
* from internal sources	2.5×10^{12}	phot/sec cm^2
* TOTAL	J = 4.9×10^{12}	phot/sec cm^2
* BLIP $D_{\lambda}^* C$	3.1×10^{12}	$cm \sqrt{Hz/W}$
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE		
	$\min t_d = 1.63$	sec
* CORRESPONDING BASELINE NESR.		
	$(NESR)_0 = 5.4 \times 10^{-9}$	$W/cm^2 sr cm^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)		
	$\min D = 0.5 - 1.4 \times 10^{11}$	$(molec/cm^2)(W/cm^2 sr cm^{-1})$
* UNCERTAINTY IN D		
	$\sigma_D = 1.9 \times 10^{10}$	$(molec/cm^2)(W/cm^2 sr cm^{-1})$



N₂O v₃ band

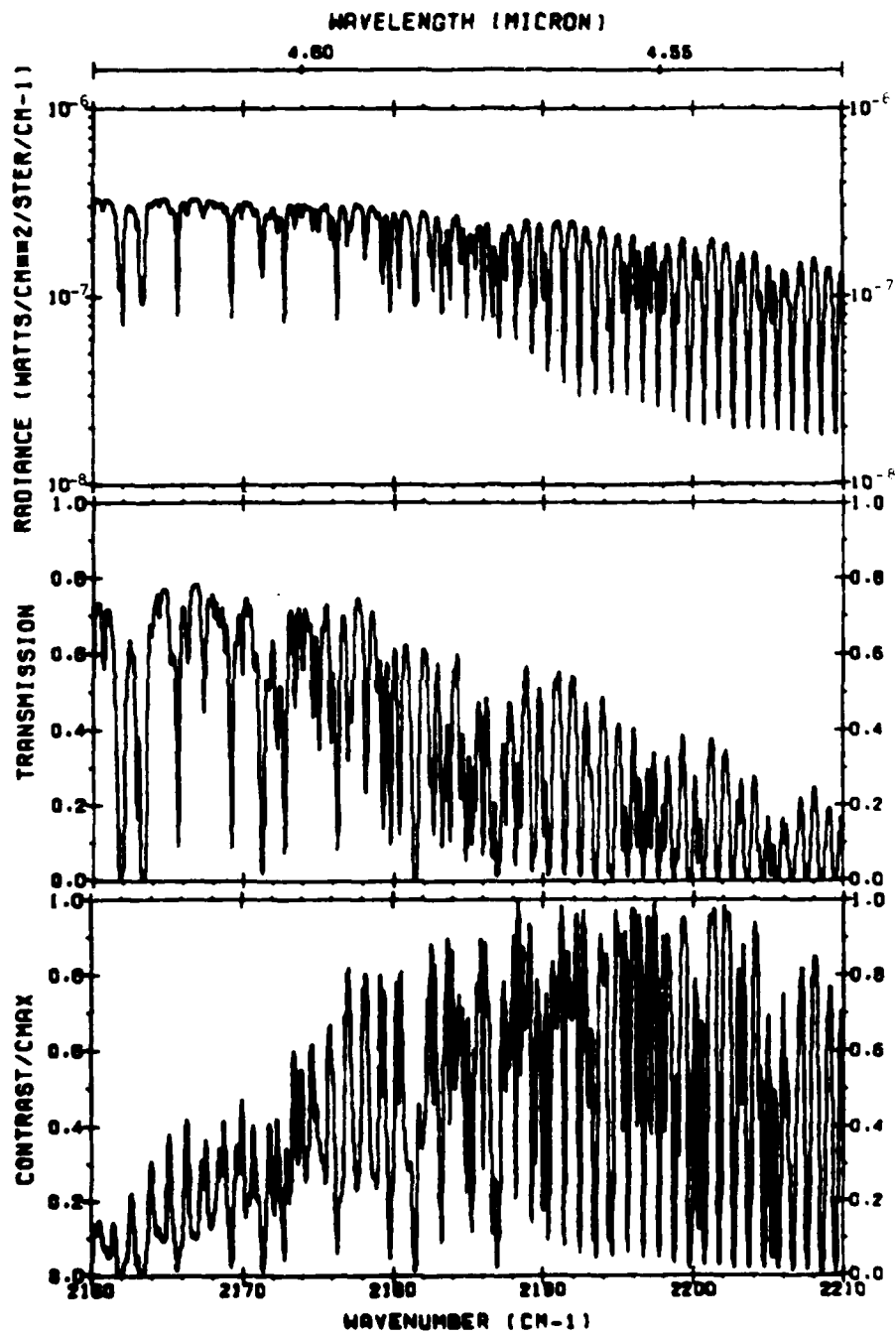
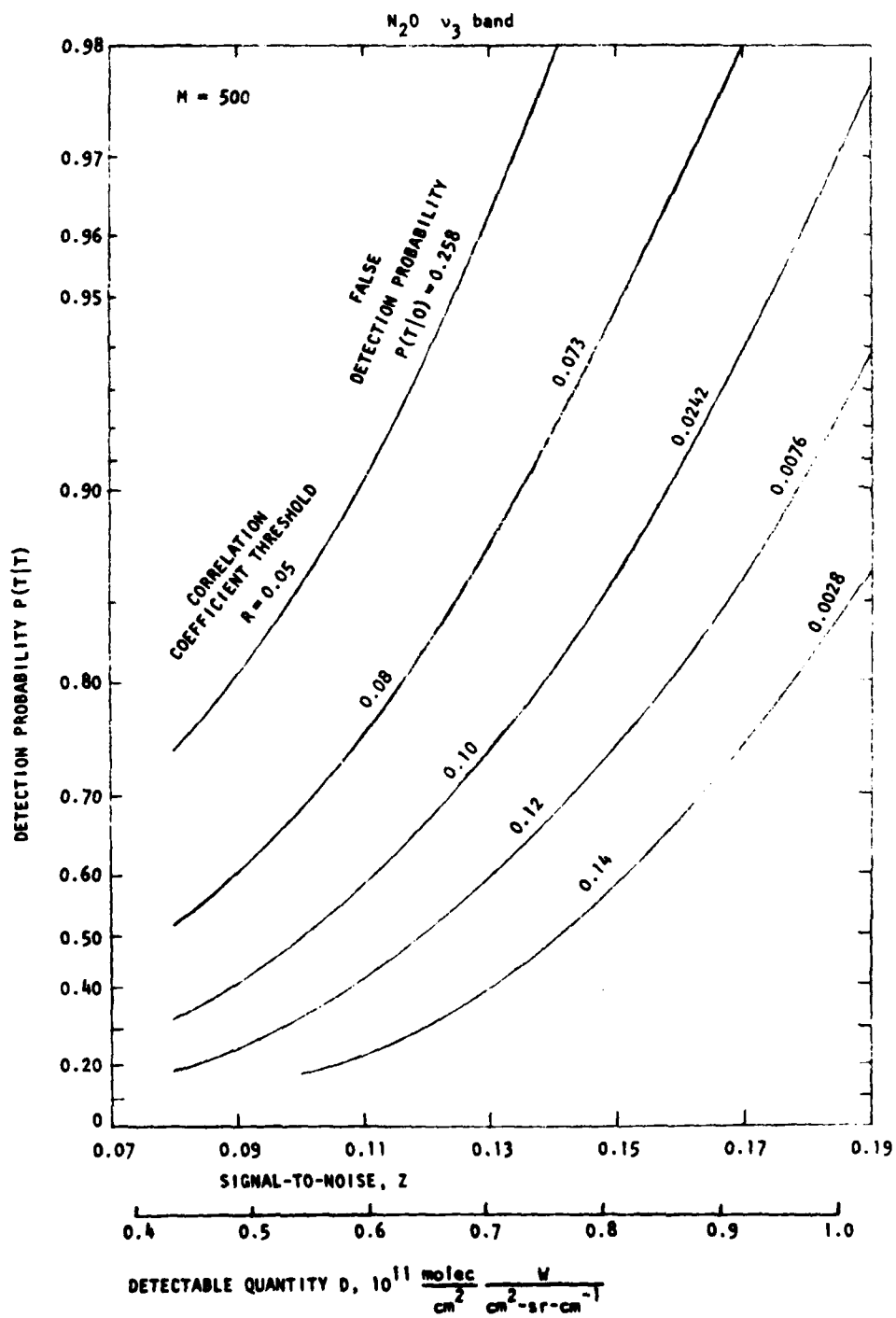


Table 19 Detection Parameters for N_2O ν_3 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2160-2210	cm^{-1}
Approximate wavelength	4.5	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	$M = 500$	
BAND PHOTON RADIANCE (scene)	2.23×10^{14}	$ph/sec\ cm^2\ sr$
Maximum of contrast $\tau_{\nu} a_{gv}$	$C_{MAX} = 8.93 \times 10^{-20}$	$cm^2/molec$
Mean contrast.	$\mu' = 3.73 \times 10^{-20}$	$cm^2/molec$
STANDARD DEVIATION OF CONTRAST	$\sigma' = 2.59 \times 10^{-20}$	$cm^2/molec$
<hr/>		
* Photon flux density on detector		
* from scene.	5.1×10^{12}	$phot/sec\ cm^2$
* from internal sources	8.5×10^{12}	$phot/sec\ cm^2$
* TOTAL	$J = 1.4 \times 10^{13}$	$phot/sec\ cm^2$
* BLIP $D_{\lambda_c}^*$	2.2×10^{12}	$cm\ \sqrt{Hz}/W$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 0.978$	sec
* CORRESPONDING BASELINE NESR.	$(NESR)_0 = 9.9 \times 10^{-9}$	$W/cm^2\ sr\ cm^{-1}$
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 0.3 - 1.0 \times 10^{11}$	$(molec/cm^2)(W/cm^2\ sr\ cm^{-1})$
* UNCERTAINTY IN D	$\sigma_D = 1.4 \times 10^{10}$	$(molec/cm^2)(W/cm^2\ sr\ cm^{-1})$



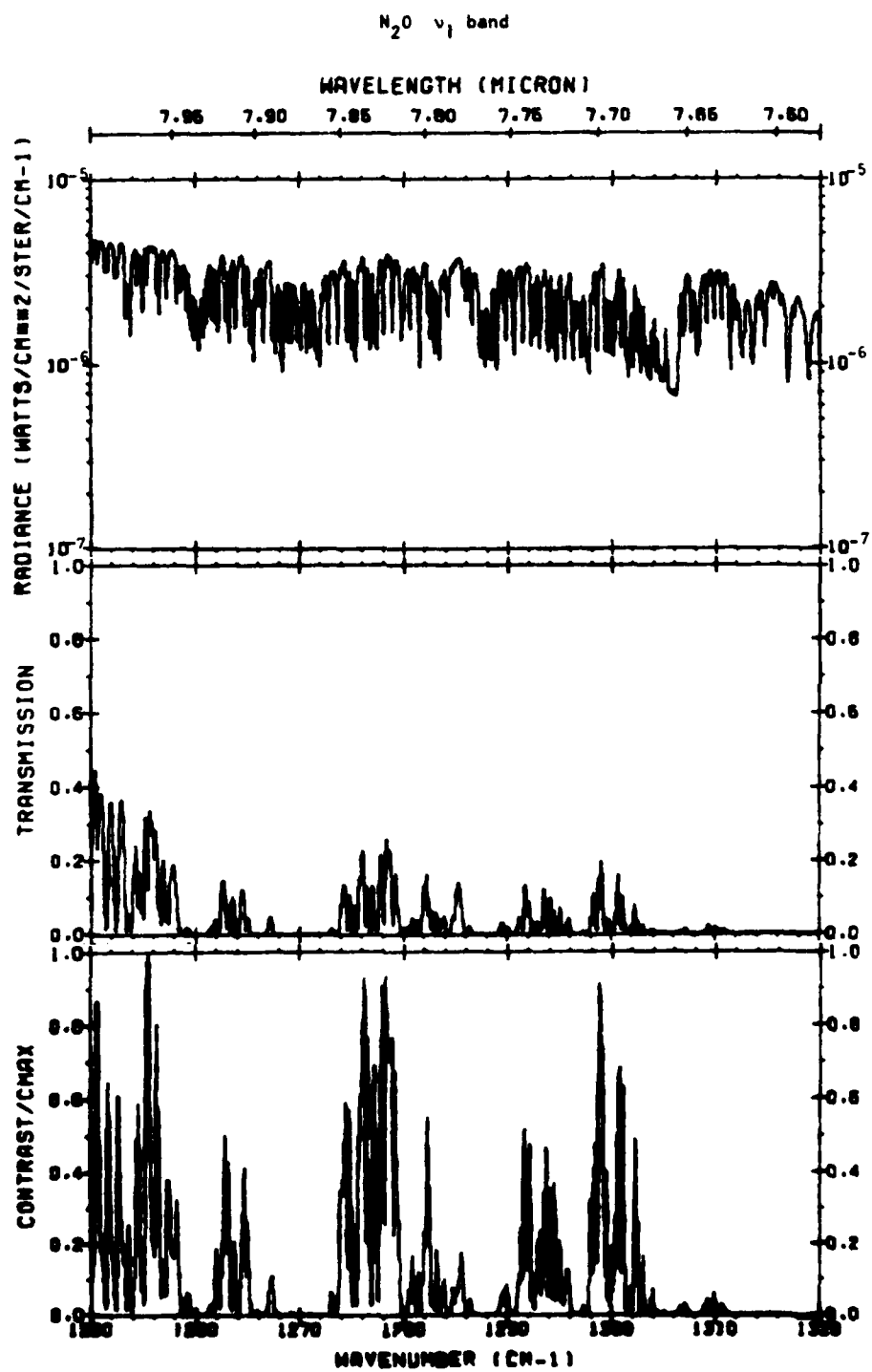
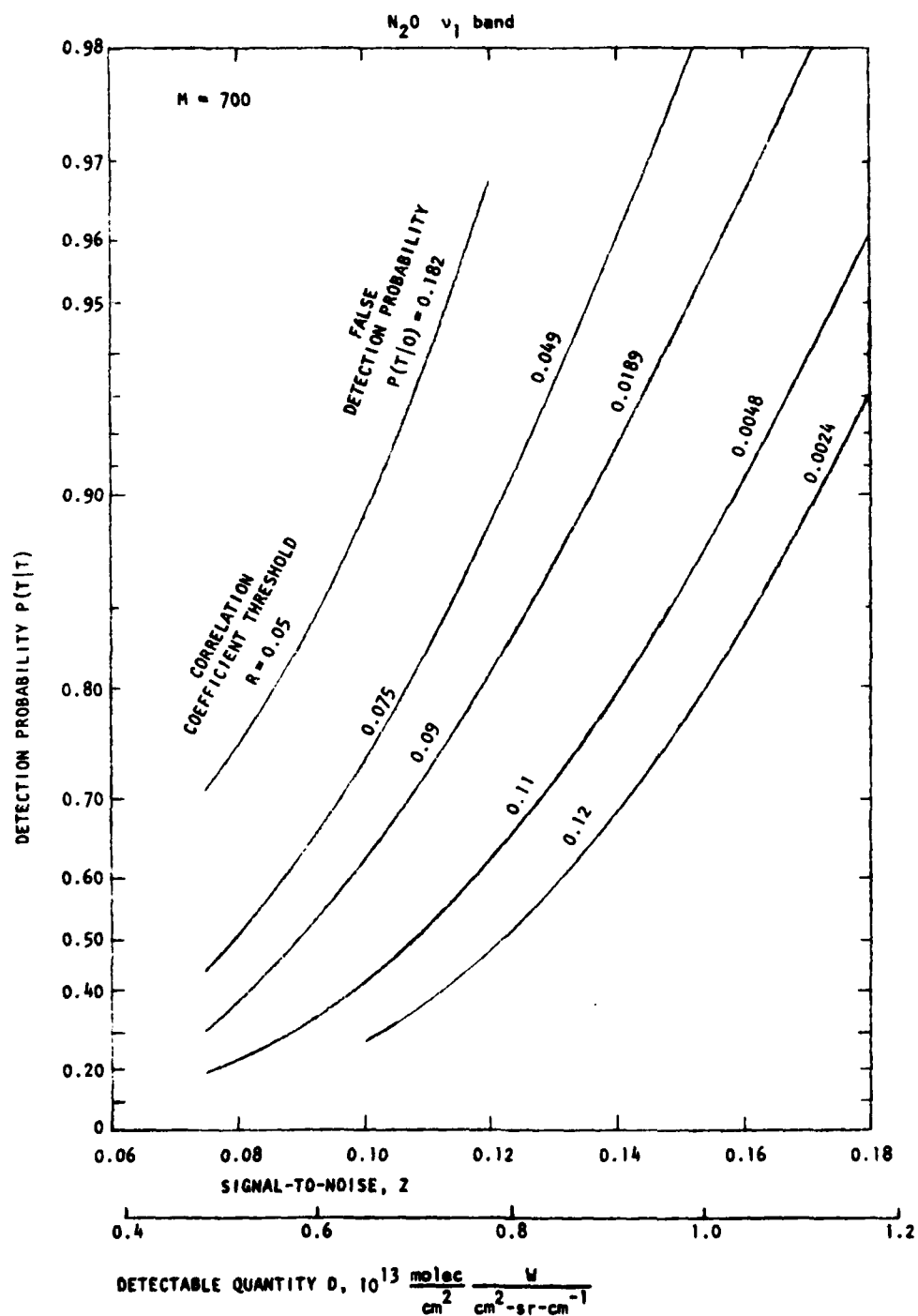


Table 20 Detection Parameters for N₂O ν_1 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	1250-1320	cm ⁻¹
Approximate wavelength	7.8	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 700	
BAND PHOTON RADIANCE (scene)	6.62×10^{15}	ph/sec cm ² sr
Maximum of contrast $\tau_v \alpha_{gv}$	C _{MAX} = 2.84×10^{-20}	cm ² /molec
Mean contrast	$\mu' = 3.40 \times 10^{-21}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 5.50 \times 10^{-21}$	cm ² /molec
<hr/>		
* Photon flux density on detector		
* from scene	1.5×10^{14}	phot/sec cm ²
* from internal sources	3.1×10^{14}	phot/sec cm ²
* TOTAL	$J = 4.6 \times 10^{14}$	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	7.7×10^{11}	cm $\sqrt{\text{Hz}}/\text{W}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 1.27 \times 10^{-2}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 2.5 \times 10^{-7}$	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 0.4 - 1.0 \times 10^{13}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_{D'} = 2.1 \times 10^{12}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)



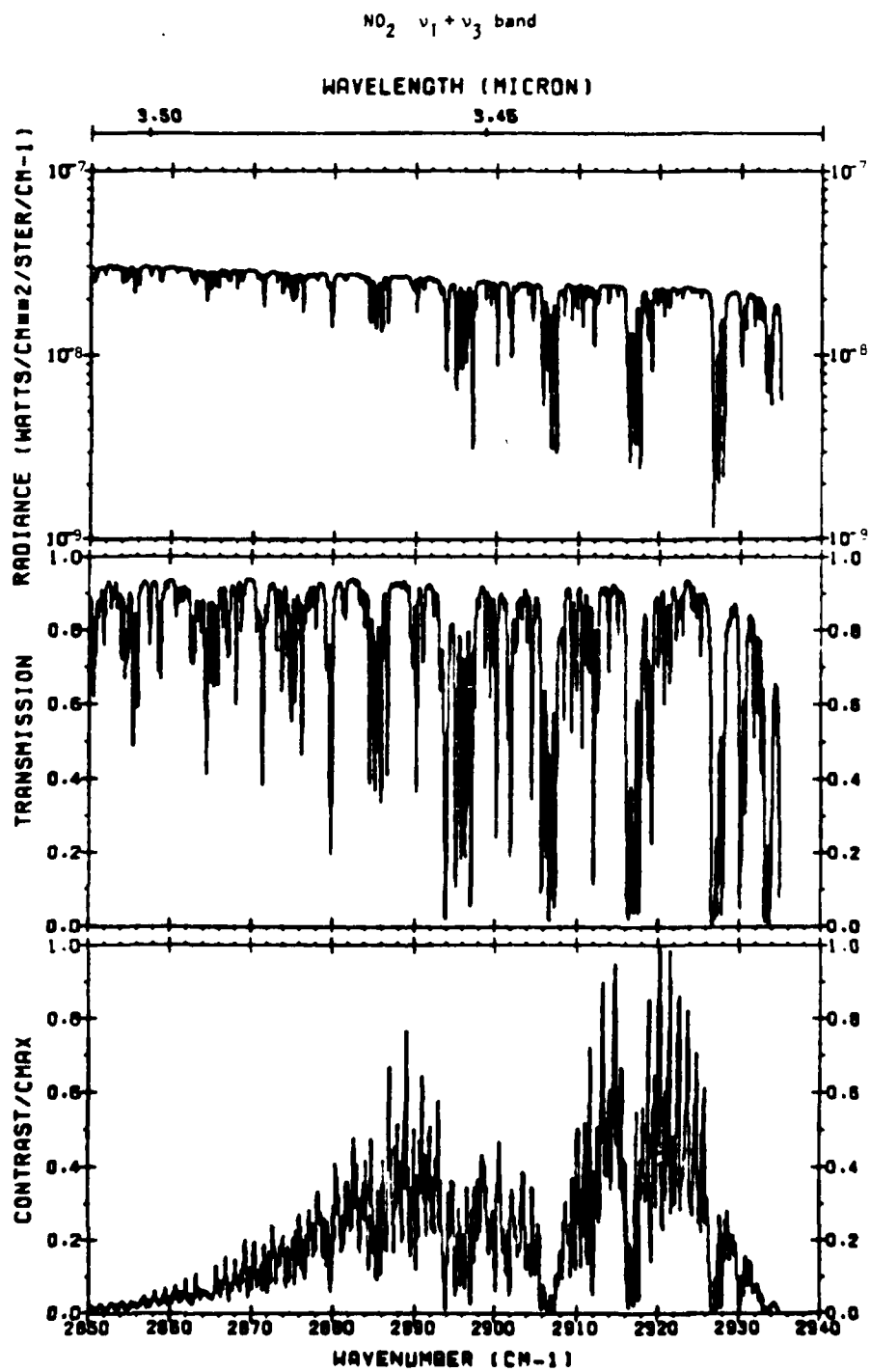
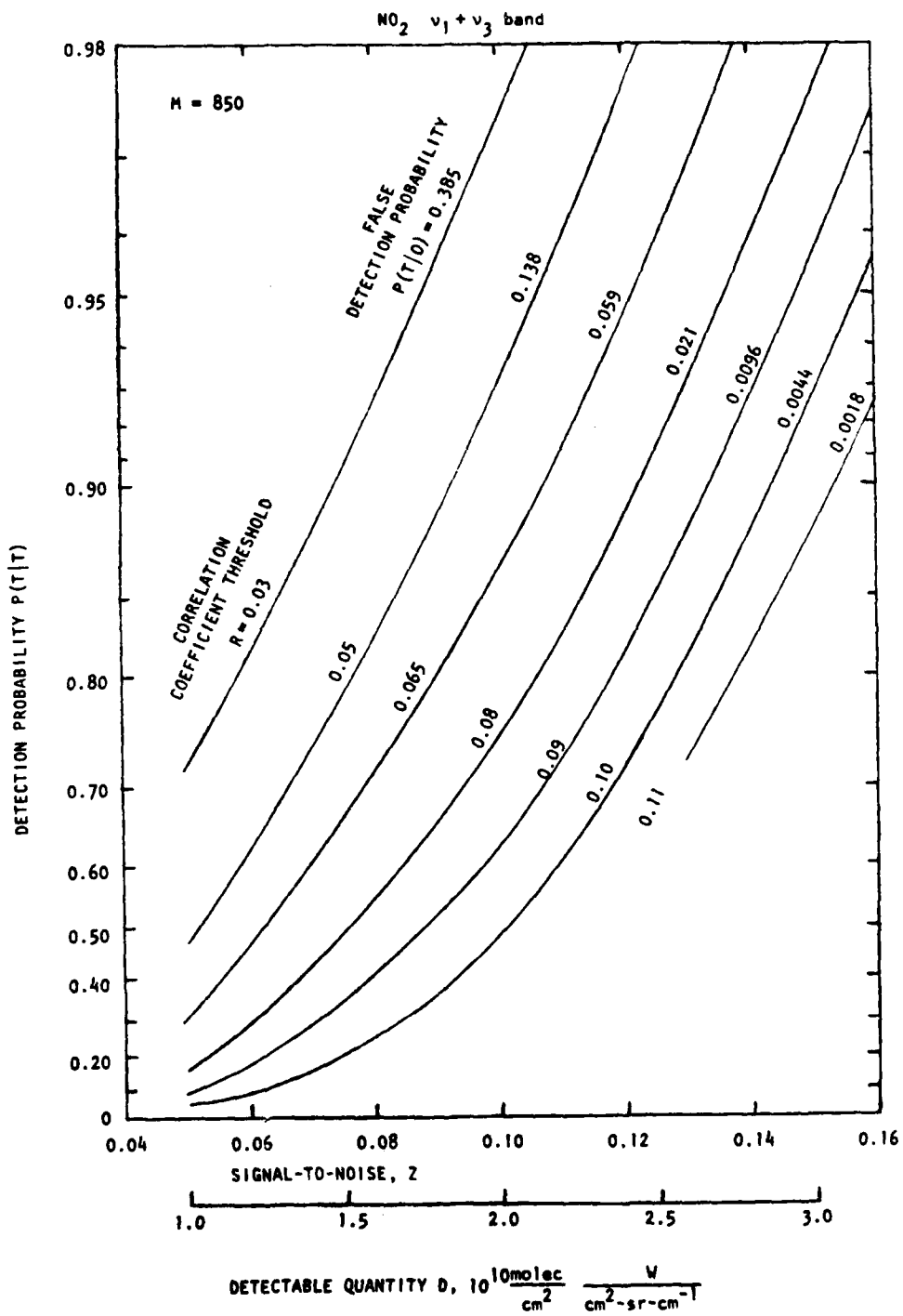


Table 21 Detection Parameters for NO₂ $\nu_1 + \nu_3$ band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2850-2935	cm ⁻¹
Approximate wavelength	3.44	μ m
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu \approx 0.10$)	M = 850	
BAND PHOTON RADIANCE (scene)	3.41×10^{13}	ph/sec cm ² sr
Maximum of contrast $\tau_{\nu}^{\alpha}_{gv}$	C _{MAX} = 1.10×10^{-19}	cm ² /molec
Mean contrast.	$\mu' = 2.28 \times 10^{-20}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 1.99 \times 10^{-20}$	cm ² /molec
<hr/>		
* Photon flux density on detector		
* from scene.	7.8×10^{11}	phot/sec cm ²
* from internal sources	8.5×10^{11}	phot/sec cm ²
* TOTAL	J = 1.6×10^{12}	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	4.8×10^{12}	cm $\sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 2.84$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 2.7 \times 10^{-9}$	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $1.0 - 2.5 \times 10^{10}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_D = 4.3 \times 10^9$	(molec/cm ²) (W/cm ² sr cm ⁻¹)



NO₂ v₂ band

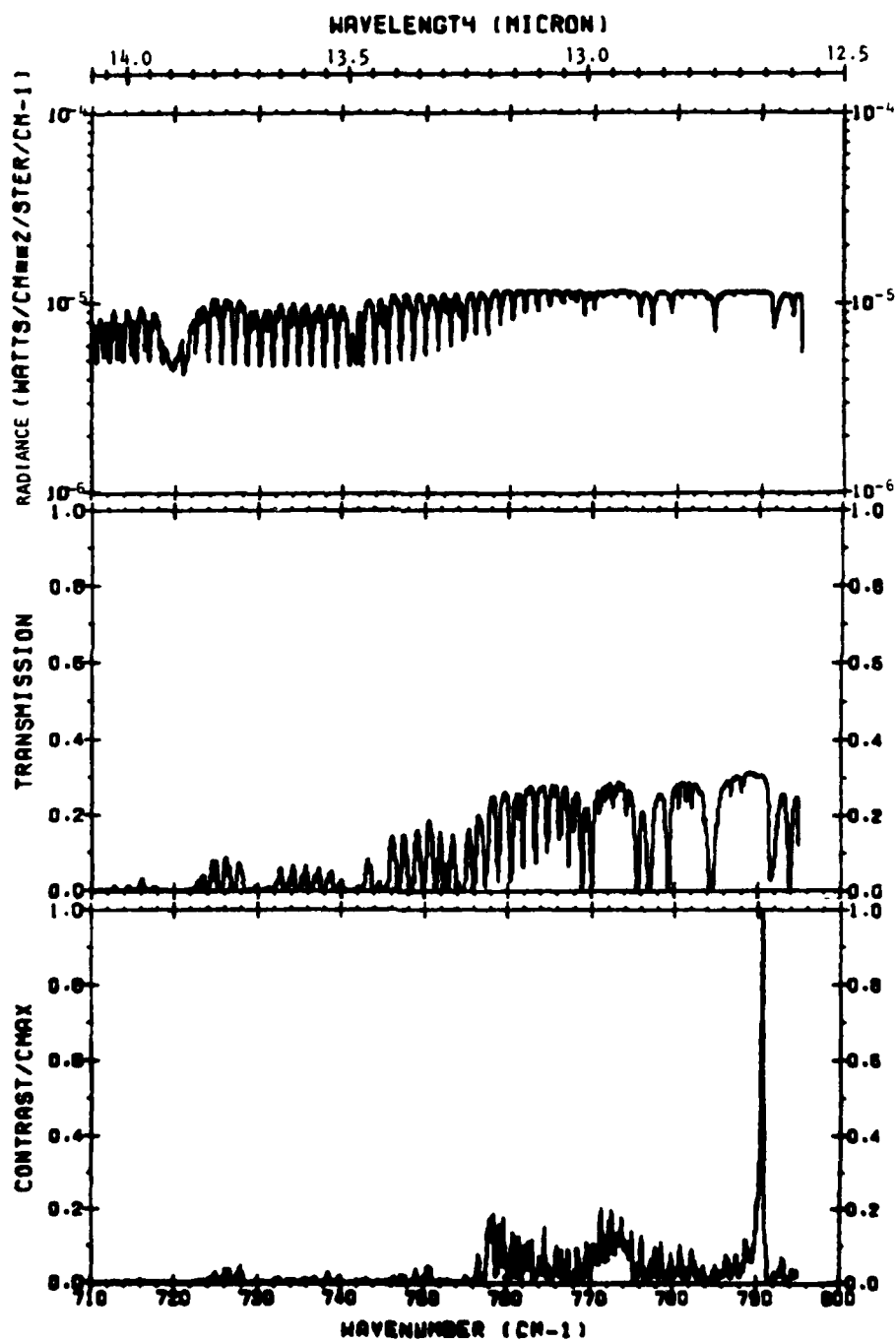
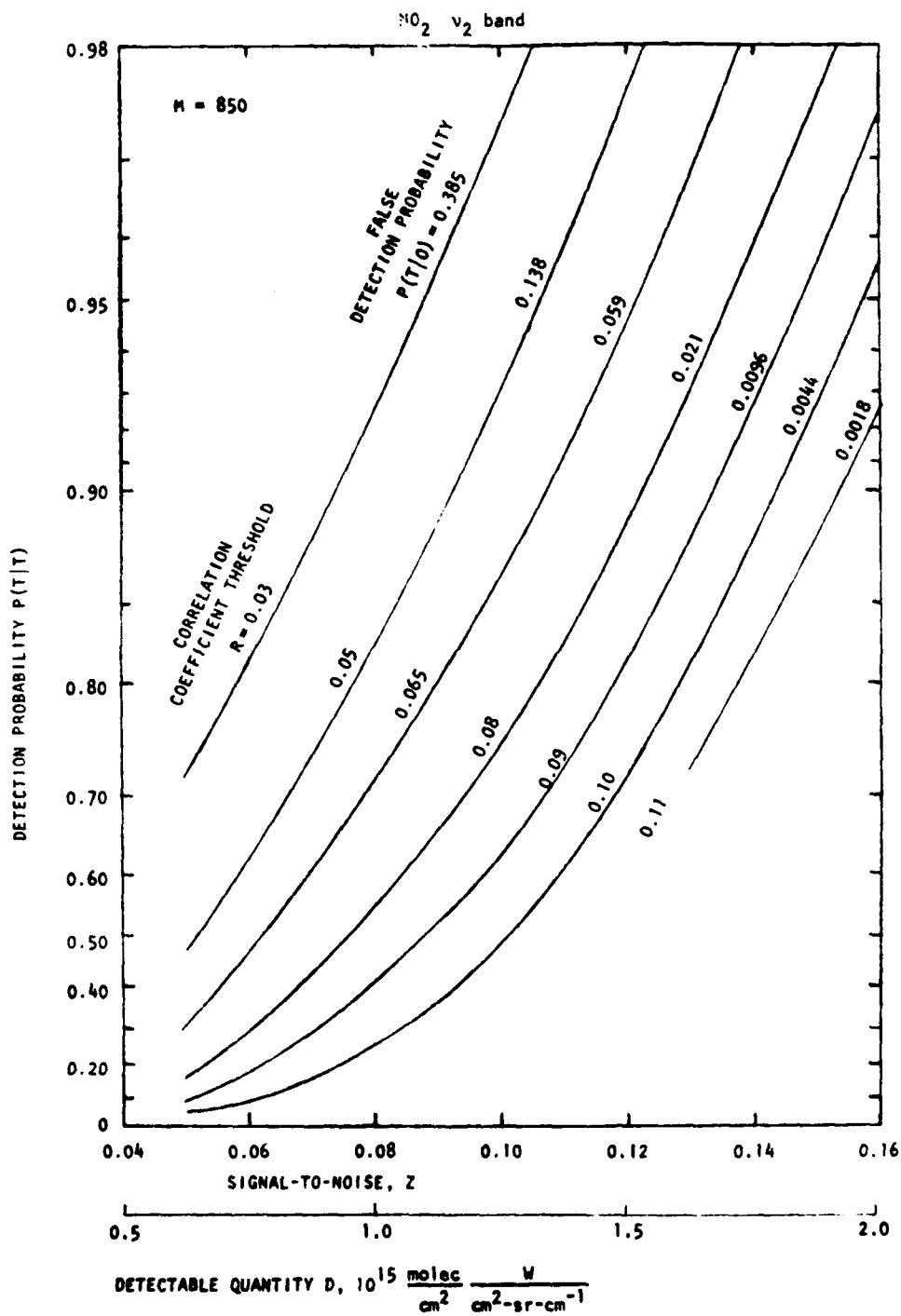


Table 22 Detection Parameters for NO₂ ν_2 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	710-795	cm ⁻¹
Approximate wavelength	13.3	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 850	
BAND PHOTON RADIANCE (scene)	5.32×10^{17}	ph/sec cm ² sr
Maximum of contrast $\tau_v \alpha_{gv}$	C _{MAX} = 1.03×10^{-19}	cm ² /molec
Mean contrast.	$\mu' = 2.95 \times 10^{-21}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 6.58 \times 10^{-21}$	cm ² /molec
<hr/>		
* Photon flux density on detector		
* from scene.	1.2×10^{15}	phot/sec cm ²
* from internal sources	1.7×10^{15}	phot/sec cm ²
* TOTAL	J = 3.0×10^{15}	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	5.16×10^{11}	cm $\sqrt{\text{Hz}}/\text{W}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_D = 5.13 \times 10^{-3}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 5.9 \times 10^{-7}$	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $0.6 - 1.75 \times 10^{15}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_{D'} = 4.0 \times 10^{14}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)



SO₂ $\nu_1 + \nu_3$ band

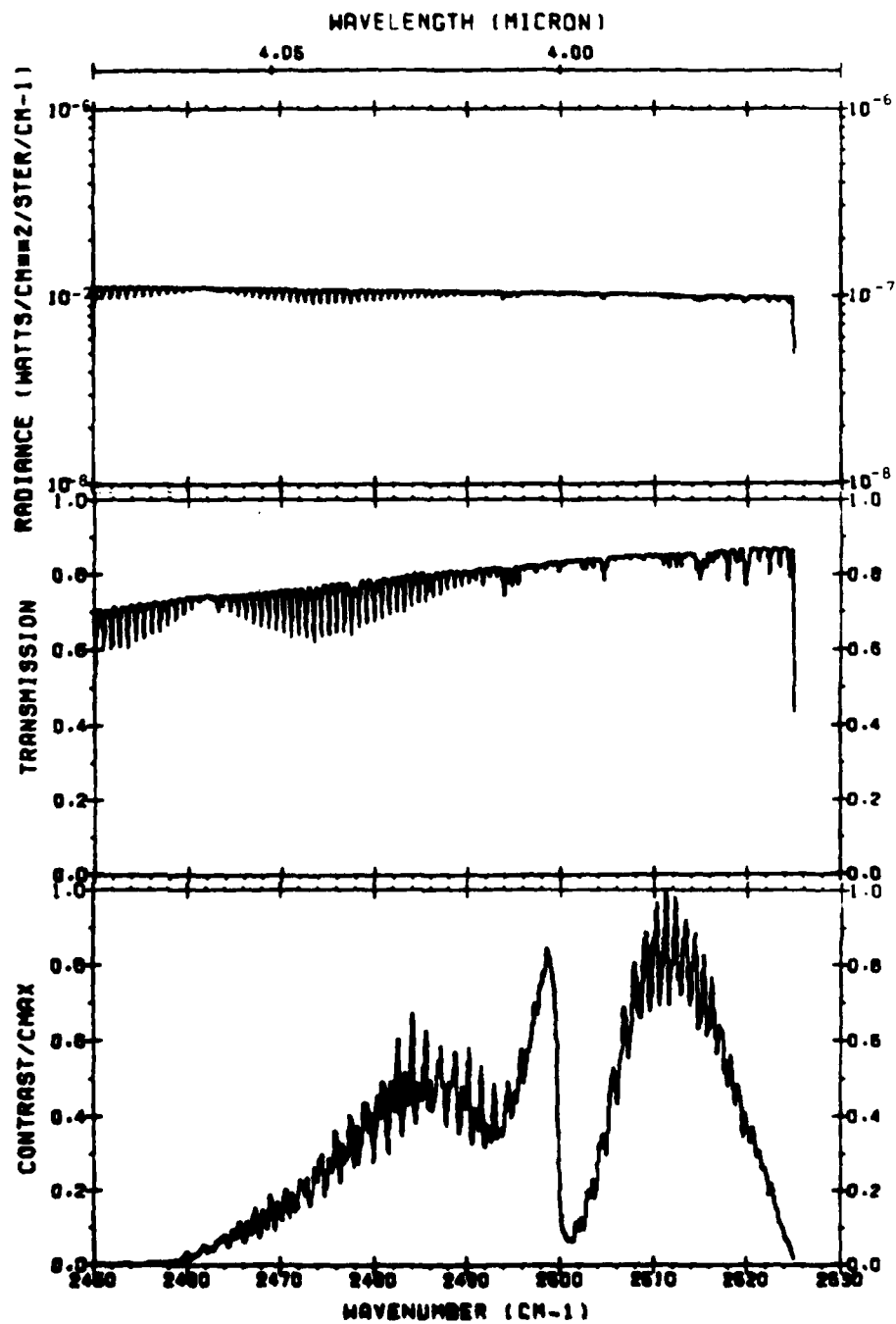
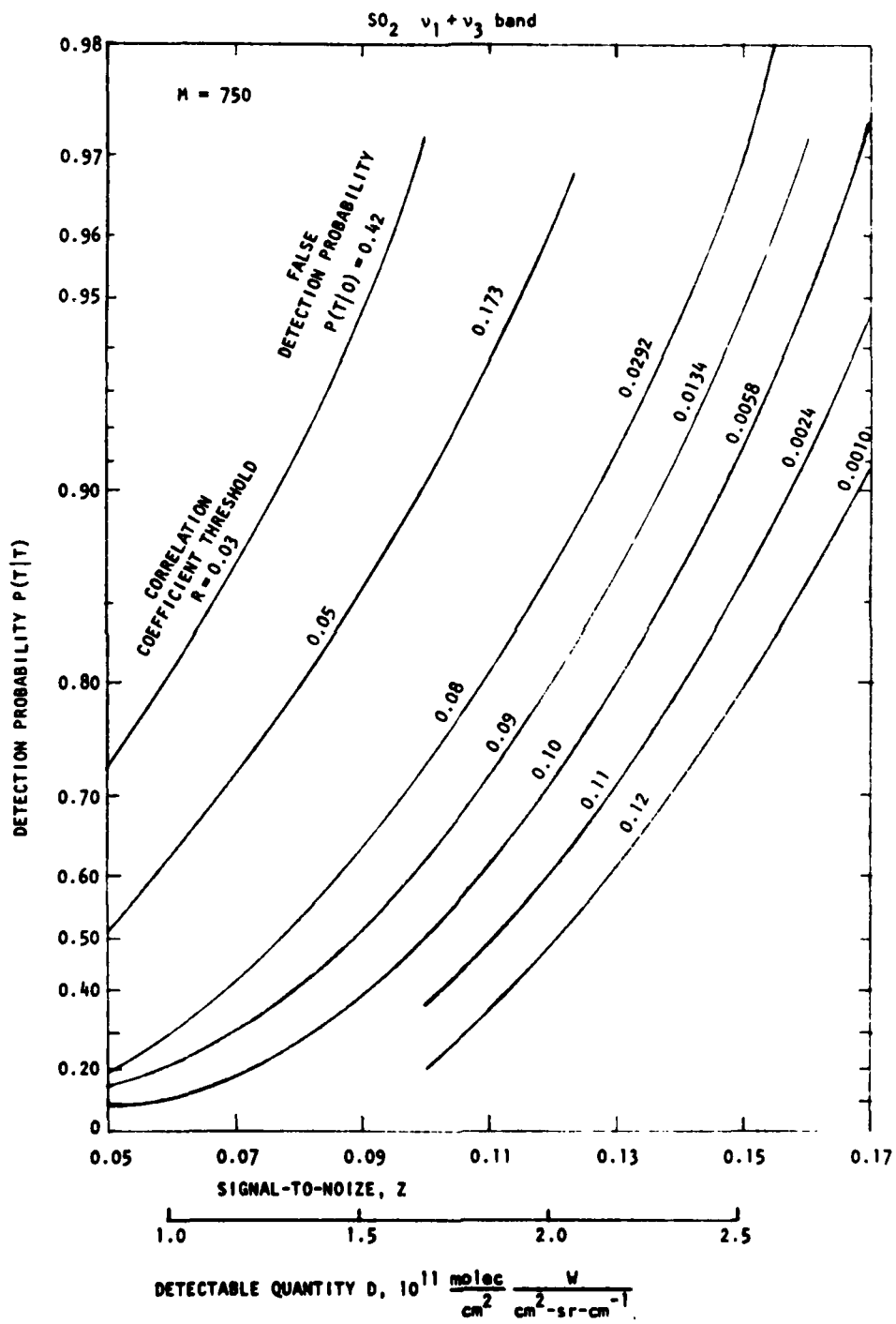


Table 23 Detection Parameters for SO₂ $\nu_1 + \nu_3$ band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	2450-2525	cm ⁻¹
Approximate wavelength	4.0	μ m
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 750	
BAND PHOTON RADIANCE (scene)	1.59×10^{14}	ph/sec cm ² sr
Maximum of contrast $\tau_{\nu} \alpha_{gv}$	C _{MAX} = 2.34×10^{-20}	cm ² /molec
Mean contrast.	$\mu' = 7.82 \times 10^{-21}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 6.08 \times 10^{-21}$	cm ² /molec
<hr/>		
* Photon flux density on detector		
* from scene.	3.6×10^{12}	phot/sec cm ²
* from internal sources	3.9×10^{12}	phot/sec cm ²
* TOTAL	$J = 7.5 \times 10^{12}$	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	2.6×10^{12}	cm $\sqrt{\text{Hz}}/\text{W}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	min $t_d = 1.32$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 7.2 \times 10^{-9}$	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	min D = $0.9 - 2.5 \times 10^{11}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_D = 3.8 \times 10^{10}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)



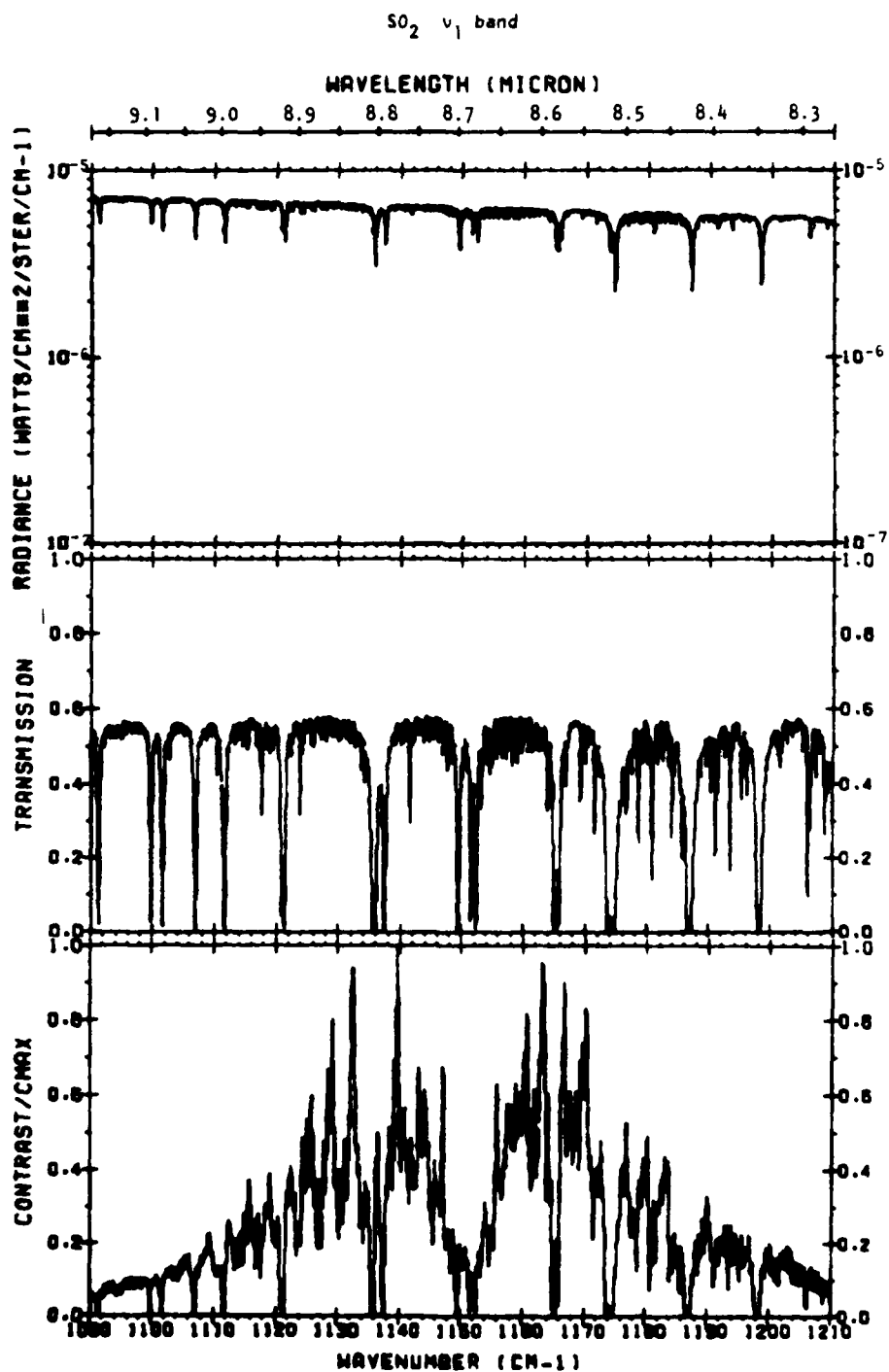


Table 24 Detection Parameters for SO₂ ν_1 band

QUANTITY	SYMBOL, VALUE	UNITS
DETECTION BAND	1090-1210	cm ⁻¹
Approximate wavelength	8.7	μm
* NO. OF SPECTRAL ELEMENTS (for $\Delta\nu = 0.10$)	M = 1200	
BAND PHOTON RADIANCE (scene)	3.18×10^{16}	ph/sec cm ² sr
Maximum of contrast $\tau_v \alpha_{gv}$	CMAX = 5.13×10^{-20}	cm ² /molec
Mean contrast.	$\mu' = 1.30 \times 10^{-20}$	cm ² /molec
STANDARD DEVIATION OF CONTRAST	$\sigma' = 9.61 \times 10^{-21}$	cm ² /molec
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* Photon flux density on detector		
* from scene.	7.3×10^{14}	phot/sec cm ²
* from internal sources	8.2×10^{14}	phot/sec cm ²
* TOTAL	$J = 1.5 \times 10^{15}$	phot/sec cm ²
* BLIP $D_{\lambda_c}^*$	4.7×10^{11}	cm $\sqrt{\text{Hz/W}}$
<hr/>		
* MINIMUM SCAN TIME FOR BLIP PERFORMANCE	$\min t_d = 7.07 \times 10^{-3}$	sec
* CORRESPONDING BASELINE NESR.	$(\text{NESR})_0 = 5.5 \times 10^{-7}$	W/cm ² sr cm ⁻¹
* MINIMUM DETECTABLE QUANTITY D (see figure)	$\min D = 0.3 - 1.0 \times 10^{13}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)
* UNCERTAINTY IN D	$\sigma_{D'} = 1.4 \times 10^{12}$	(molec/cm ²) (W/cm ² sr cm ⁻¹)

